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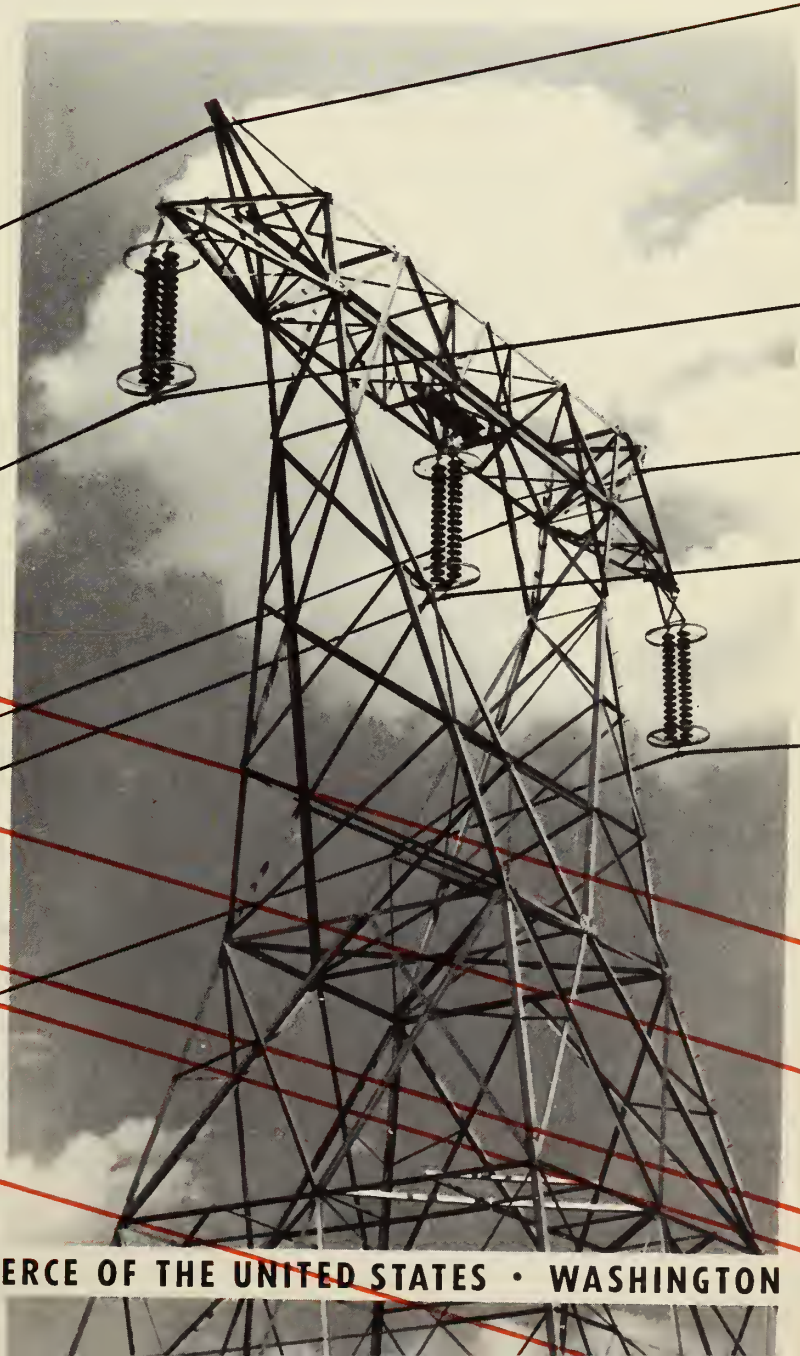

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TVA: WHAT'S NEXT?

Natural Resources Department

CHAMBER OF COMMERCE OF THE UNITED STATES, WASHINGTON 6, D. C.

1958

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ACKNOWLEDGMENTS

The Chamber of Commerce of the United States acknowledges the services of Charles D. Curran, consulting engineer, Washington, D. C. Mr. Curran was retained by the Chamber from August 20 to December 31, 1957 for the purpose of preparing this report.

In compiling and analyzing the data here presented Mr. Curran drew on twenty-five years of professional experience in various federal agencies and commissions. All but the *Foreword* and the section on *Tennessee and the Southeast* was drafted by him.

Mr. Curran in turn has acknowledged "that Brigadier General Herbert D. Vogel, Chairman of the TVA Board, and his staff were highly cooperative in facilitating my search for basic information and statistics."

30 Sept 58 Ch. 1 SMITHW, FEB. 11, 1959

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FOREWORD

—How much money have taxpayers of the nation invested in TVA?

—Do consumers of TVA electricity pay their full share of power costs?

—What are the actual benefits and costs of the TVA flood control and navigation projects?

—Is TVA fertilizer sold at its true cost of production?

—How much longer must TVA subsidies continue?

Answers to these basic questions are essential in any objective evaluation of TVA's operations, and before Congress makes any major changes in TVA. And yet discussion of legislative proposals dealing with TVA reveals that fundamental facts about TVA are little known or understood.

TVA has become a symbol of public power, and around it has grown a tangle of misconceptions, false assumptions, and erroneous information. Some special pleaders for TVA have deliberately obscured the facts. Although TVA itself reports to Congress and the public as required by law, over the years it has also conducted an extensive "public relations" program that presents—quite naturally—a one-sided view.

In 1955, when the Congress was considering legislation that would authorize a vast expansion of TVA power facilities, it was evident that few people clearly understood the implications of an expanding TVA. Although Congress was aware of the nation's growing power requirements, it seemed uncertain about how the needs of the TVA area should be met—whether TVA should be given new authority to expand, as proposed, by raising money through the sale of revenue bonds.

Proponents of TVA expansion contended that the federal government must meet the entire area's power needs through TVA alone. Opponents argued that TVA was already too big, that it was not obligated to satisfy all power needs in the area, and that ways other than expanding TVA operations should be found for meeting the needs.

New Legislation Questioned

Bills authorizing TVA to issue revenue bonds were introduced in the 84th Congress (1955 and 1956) but did not get out of committee. Hearings were held by the Senate Public Works Committee but no report was made.

In the first session of the 85th Congress a bill (S. 1869) was passed by the Senate after brief hearings by the Public Works Committee. The House Public Works Committee approved a bill (H.R. 4266) after several days of public hearings, and reported it without change at the end of the session.

Since the revenue bond proposal was first introduced, the need for more up-to-date information about TVA's business operations—primarily the electric utility system—has become more imperative. Little light has been thrown on TVA by which to judge the merits of proposed legislation.

What is the TVA picture in today's perspective?

What are the implications of the revenue bond financing plan?

What Congressional action is desirable?

The national importance of these questions prompted the Chamber of Commerce of the United States to study the resource development functions of the Tennessee Valley Authority and to outline reasonable objectives for the future.

This report—"*TVA: What's Next?*"—is based on the results of that study.

The report analyzes 25 years of TVA operation. It shows the relationship of electric power to other

resource developments; appraises TVA improvements in navigation and flood control on the Tennessee River; probes into TVA's commercial production of fertilizers and electricity; and computes the cost to the public of putting government into the business of developing our natural resources.

Included in the report, also, is an attempt to measure the extent to which an entire region and its resources have been improved economically through the application of large federal appropriations and subsidies.

Earlier Studies Substantiated

Many of the facts and figures in this report are new. The TVA financial data are compiled as of June 30, 1957. The new information, however, substantiates the conclusions in earlier National Chamber studies of TVA and its operations:

"An Analysis of the Real Cost of TVA Power", published in 1948, showed that the taxpayers' investment to June 1946 had amounted to $742,000,000, and that taxes and interest totalling $234,000,000 had been "lost" through TVA business operations. A summary of the major conclusions of this 1948 report states:

> "Seemingly every available device has been used to minimize the reported cost of power production, and thereby provide a basis for passing on to the federal taxpayer, who is supporting navigation and flood control, unjustifiably high costs for these adjunct functions of river development."

"The Continuing Cost of TVA", published by the Chamber in 1954, showed that the taxpayers' investment to June 1952 had increased to $1,270,000,000. Taxes and interest were $347,000,000 and $284,000,000, respectively, below the amounts that would have accrued under private enterprise operation. The report concluded that TVA electric power can and should be required to pay its own way, including all applicable taxes and interest, stating:

> "The job is not to patch up TVA to make it acceptable, or even less objectionable. No corporate creation of Congress should be continued unless there is a clear, definable public interest to be served that cannot be served in any other way."

Expansion of TVA Power

Beginning about 1950 TVA launched into a rapid expansion of its power system, primarily for supplying electricity to the government's atomic energy facilities. Practically all of the new construction was steam generating plants. In shifting from a hydroelectric system to a predominantly steam electric system, TVA departed from its original function of developing the Tennessee River. It soon became the largest electric power utility in the world.

Since 1954 Congress has refused to appropriate funds for construction of new power units. However, TVA has proceeded to add new units to existing steam plants, by using the revenue from power sales. So far, Congress has acquiesced to this procedure, permitting TVA to nullify the refusal of new appropriations. On its own initiative, furthermore, TVA has by-passed a provision in a 1948 law intended to restrict the use of power revenues to the construction of new plants *specifically authorized by Congress.*

By June 1957 TVA had installed 5,850,000 kilowatts (kw) of electric generating capacity in seven steam plants, bringing its total system capacity to 9,889,485 kw. An additional plant capacity of 1,856,000 kw was under construction at that time.

Further Expansion Proposed

Proposals before the 84th and 85th Congresses would have authorized TVA to build additional steam electric plants for meeting all future power needs in the region, and to have an assured source of funds for the necessary long-term financing.

With authority to issue revenue bonds for expansion, TVA would be practically assured that it will always be the sole supplier of electric power in an 80,000-square mile area. TVA could eventually enlarge this service area and continue to sell power to domestic and industrial users and to government agencies at prices which are well below true production costs.

The TVA utility system already enjoys special exemptions—from regulated accounting and full responsibility for taxes and interest—not granted to other public utilities. If new revenue bond expansion is authorized and TVA continues to escape utility regulation and to disregard important business principles, any new expansion of its power system could only mean additional cost to the nation's taxpayers and increased competition with private enterprise.

The cost of additional TVA facilities to the taxpayer would be imposed upon costs that now exceed $2 billion. Subsidies which have resulted in so-called "cheap" TVA fertilizers and electricity would be increased.

These facts are brought out in the following brief summary of the major findings in this report.

New Findings Reported

The Investment. The federal government has spent about $3.5 billion through TVA since 1933. Congress has appropriated $1.9 billion, and TVA has received $1.5 billion of revenues from the sale of power. The taxpayers' net investment in TVA power facilities is about $1.5 billion. Only the appropriation investment in power is being reimbursed to the Treasury.

Navigation. TVA has allocated $159 million to navigation improvements; this is more than double the amount originally estimated when the project was authorized. Some of the cost allocated to navigation should have been charged to power development. Thus, navigation improvement is assessed against the taxpayer while charges to power users are reduced proportionately.

River traffic, excluding sand and gravel, and local shipments primarily for TVA itself, amounted to 3.7 million tons in 1956, whereas original estimates indicated the movement of 15.3 million tons by 1950. Annual navigation costs are estimated to be $9.3 million, compared with TVA's reported cost of $3.8 million. The taxpayer, rather than the direct beneficiary, continues to make up the annual deficiency.

Flood Control. TVA has allocated $184 million to flood control. Some of the cost allocated to flood control should have been charged to power development. Thus, flood control costs are assessed against the taxpayer while charges to power users are reduced accordingly.

TVA reservoirs cover a combined area of 602,000 acres, whereas original project justifications indicated that 666,000 acres might be flooded occasionally without the flood control projects. Annual flood control benefits amount to about $6.9 million and annual costs to about $8.6 million; estimates of benefits probably are high and estimates of cost probably are low. The taxpayer, rather than the direct beneficiary, continues to pay the difference.

Fertilizer. TVA fertilizers are sold commercially at prices which average about 10 percent below the competitive market. The difference constitutes a part of the subsidy to TVA fertilizer operations.

TVA's price does not cover its production cost; no charges are made for taxes or interest, while costs of research and development are considered administrative expenses. The fertilizer program is also subsidized by below-cost electric power.

Electric Power. Total installed electric generating capacity is 9,900,000 kw, of which 3,600,000 kw are hydroelectric and 6,300,000 kw are steam electric. The TVA electric system is the largest electric utility operation in the world.

In addition to lowering power costs by charging off some costs to navigation and flood control, TVA does not charge its power operation for interest on federal funds. TVA is not assessed any federal taxes or tax equivalent, and pays only nominal taxes to state and local governments. All of these elements of costs should be, but are not, reflected in the price of power.

As the result of omitting these costs, TVA can sell power wholesale at subsidized rates which averaged 4.13 mills per kwh (kilowatt hour) in

1957. Computations indicate that the true cost of TVA power was at least 5.05 mills per kwh and that, if market rates had been charged for interest alone, the cost would have been 6.21 mills per kwh.

Costs of electric power not included in TVA rates, and therefore not paid by its power users, are charged to the general taxpayer.

Results of Federal Intervention

The TVA has displaced practically all of the investor-owned electric utilities and many of the regularly established governmental agencies in the Tennessee River basin. The entire region depends on TVA for its electric power supply, for which TVA seeks to maintain complete responsibility. TVA carries on resource management and development which normally is the responsibility of state agencies.

Dependence on the federal government for development of the resources of any river basin, as in the Tennessee Valley, is inconsistent with the American free enterprise system. Dependence on TVA, for example, has led to loss of local initiative and responsibility, has resulted in discriminatory use of taxpayers' money for the benefit of selected citizens, and has produced unfair competition not only with investor-owned utilities but also with other industries not favored by tax-supported power supplies.

TVA has become the political thesis of many public officials. Most beneficiaries of the TVA system have all but closed their eyes to any examination or criticism of this governmentally bestowed benefaction. TVA supporters want no new restrictions on TVA—only greater favors and more room for expansion.

Recommendations for Corrective Legislation

This examination of how TVA has used the taxpayers' money reveals that its business operations are in conflict with basic concepts of the American competitive enterprise system. In the light of this study, and in support of the principles and declarations adopted by the great majority of its members, the National Chamber continues to oppose the valley authority type of government enterprise.

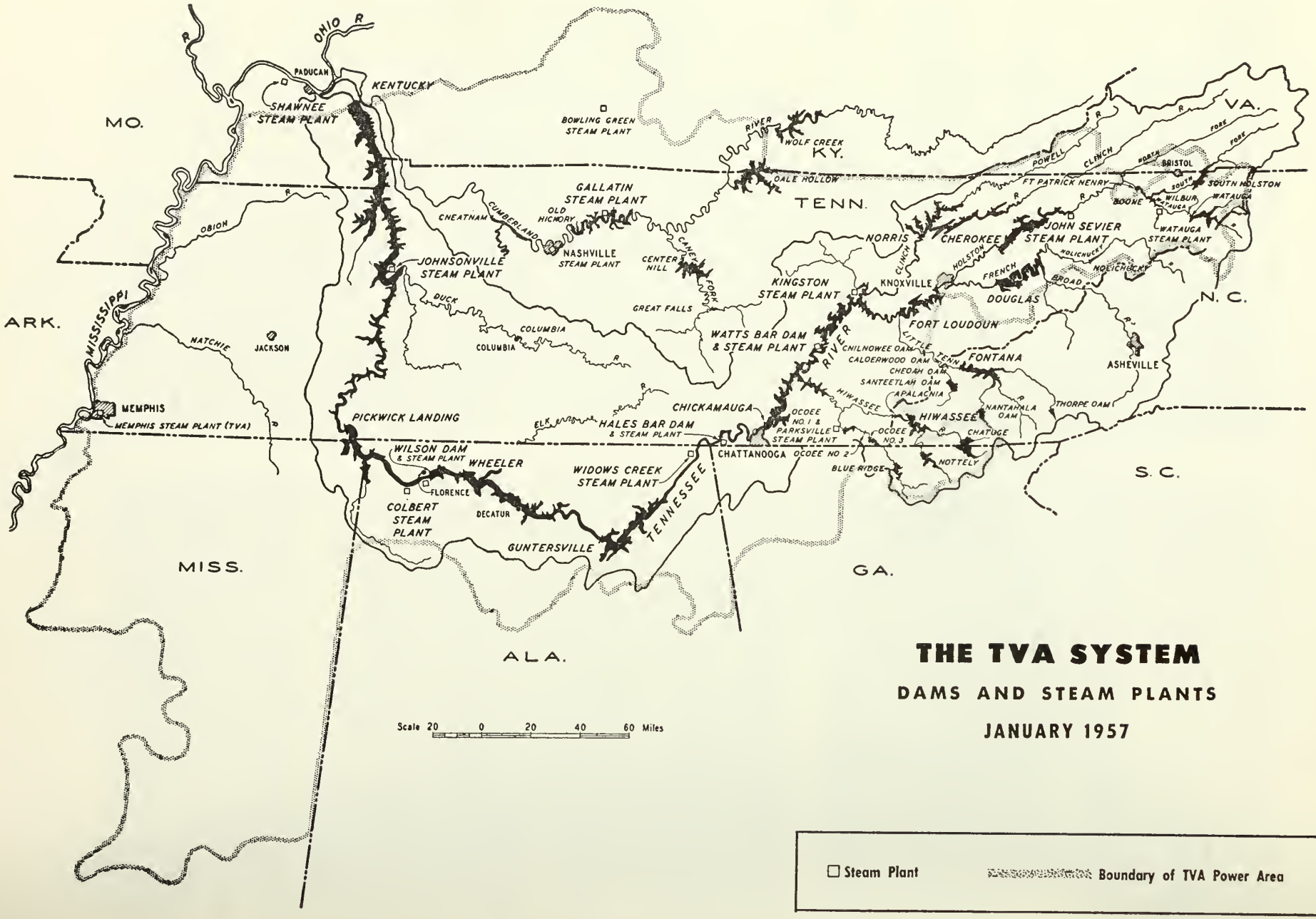
The National Chamber recommends to Congress that TVA be relieved of its utility responsibilities as soon as practicable. The governmental functions now performed by TVA should be transferred to existing government agencies—federal, state, or local.

Furthermore, for the long-range solution of the TVA problem, which would require several amendments to the TVA Act of 1933, the Chamber recommends the following:

1. Restriction of TVA power to its present service area.
2. Operation of the multi-purpose dams for flood control, navigation, and low-flow regulation by the Army Corps of Engineers.
3. Regulation of the sale of TVA-generated power by the Federal Power Commission, and establishment of new rates which will cover all costs of producing the power, including: operating and maintenance costs, interest for return to the Treasury, amortization, replacements, equivalents of federal taxes, and all local and state taxes that would be payable if the facilities were privately owned.
4. Elimination of the sole-supplier clause in TVA power contracts to permit power users to build their own facilities or purchase power from non-federal sources, and to relieve the federal government of any obligation to continue meeting power needs of industries, municipalities, and domestic and rural customers in the TVA area.
5. Authorization and encouragement of local or state organizations, either public or private, to purchase and operate TVA's power facilities.

Pending these amendments to the TVA Act, Congress should require TVA to continue repaying the appropriation investment in power facilities at no less than the rate established in the Government Corporations Appropriation Act of 1948. Congress also should retain direct control over all TVA operations until the commercial power facilities are sold and the governmental functions are transferred to other agencies.

Finally, until such recommendations are carried out, no further expansion of TVA's electric power system or its other functions should be permitted through either Congressional appropriations or the sale of revenue bonds.


THE TVA SYSTEM
DAMS AND STEAM PLANTS
JANUARY 1957
Steam Plant
Boundary of TVA Power Area
Scale 20 0 20 40 60 Miles
MO.
KENTUCKY
KY.
TENN.
VA.
N. C.
S. C.
GA.
ALA.
MISS.
ARK.
OHIO R.
MISSISSIPPI
TENNESSEE
RIVER
PADUCAH
SHAWNEE STEAM PLANT
BOWLING GREEN STEAM PLANT
WOLF CREEK
DALE HOLLOW
GALLATIN STEAM PLANT
OLD HICKORY
NASHVILLE STEAM PLANT
CHEATHAM
CUMBERLAND
CENTER HILL
CANEY FORK
JOHNSONVILLE STEAM PLANT
DUCK
GREAT FALLS
COLUMBIA
OBION
NATCHEZ
JACKSON
MEMPHIS
MEMPHIS STEAM PLANT (TVA)
PICKWICK LANDING
WILSON DAM & STEAM PLANT
WHEELER
FLORENCE
DECATUR
COLBERT STEAM PLANT
GUNTERSVILLE
WIDOWS CREEK STEAM PLANT
ELK
HALES BAR DAM & STEAM PLANT
CHICKAMAUGA
CHATTANOOGA
WATTS BAR DAM & STEAM PLANT
KINGSTON STEAM PLANT
NORRIS
KNOXVILLE
CHEROKEE
JOHN SEVIER STEAM PLANT
FORT LOUDOUN
FONTANA
DOUGLAS
FRENCH BROAD
HOLSTON
CLINCH
POWELL
LITTLE TENN.
CHILHOWEE DAM
CALOERWOOD DAM
CHEOAH DAM
SANTEETLAH DAM
APALACHIA
HIWASSEE
NANTAHALA DAM
THORPE DAM
CHATUGE
NOTTELY
OCOEE NO. 1 & PARKSVILLE STEAM PLANT
OCOEE NO. 3
OCOEE NO. 2
BLUE RIDGE
FT PATRICK HENRY
BRISTOL
SOUTH HOLSTON
WATAUGA
WILBUR
BOONE
WATAUGA STEAM PLANT
ASHEVILLE

THE TVA TODAY

The Beginning

A QUARTER OF A century ago a new federal entity was created. Five weeks after taking office in 1933, President Franklin Roosevelt addressed a message to Congress requesting legislation to create a Tennessee Valley Authority, "a corporation clothed with the power of Government but possessed of the flexibility and initiative of a private enterprise." His message went on to say, "If we are successful here we can march on, step by step, in a like development of other great natural territorial units within our borders."

Within another five weeks the legislation creating the Tennessee Valley Authority had been enacted and placed before him for signature.

As of December 1957, approximately two billion dollars has been expended for permanent plants for the manufacture of fertilizer, the improvement of navigation, the control of floods, and the development of electric power.

In 1937, in 1944, and again in 1949, Presidential messages requested the establishment of additional valley authorities. Congress has never considered favorably these requests.

In the quarter century since TVA was created, many papers and books have been written on one aspect or another of the agency and its operations. Practically every one of these has been in support of a particular point of view. Those unsympatetic with the legislation have been extremely critical of its execution, the personnel engaged in its program, its accounting methods, and its engineering. On the other hand, those who consider the engineering works or personnel policies a success tend to be so lavish in their praise as to endorse every related element involved in either the legislation or the works carried out under its authority. Somewhere between these extremes lies the true evaluation of TVA.

It is not the purpose of this analysis to argue whether or not the legislation was socialistic. That point has been discussed at adequate length by specialists whose views are readily available in the public record.

Nor is it the purpose of this analysis to argue whether or not the government has properly entered entered into business in competition with its own citizens or whether TVA has, in fact, been given a utility responsibility by Congress. The Congressional authorization in 1939 for TVA to sell bonds—in order to meet the costs of acquiring the electric utility properties of the Commonwealth and Southern Company—seems to dispose of these questions.

The objective of this analysis is to examine the major capital expenditures of the Tennessee Valley Authority. Three purposes are involved: (1) whether they were authorized undertakings under the law; (2) whether they have been efficiently and economically constructed and operated; and (3) what the costs have been and where they have been borne.

Answers to these inquiries are available in the records that have been amassed over the past quarter century. Objective appraisal of the facts may assist others in determining whether or not the administrative device—the valley authority—should be extended to other regions. Such appraisal may also help decide what changes should be made in the operating charter of TVA.

The Tennessee River

THE TENNESSEE RIVER is formed by the confluence of the Holston and French Broad Rivers in the east central part of the State of Tennessee. The river flows southwesterly across the eastern part of Tennessee into Alabama, thence westerly across northern Alabama and northerly between Alabama and Mississippi, and across the western part of Tennessee and Kentucky into the Ohio River at Paducah.

The length of the river is 652 miles. This entire reach is now improved for navigation. The drainage area is 40,600 square miles. Its source is 800 feet above mean

sea level and its mouth 302 feet above mean sea level.

The drainage basin lies in the states of Kentucky, Virginia, Tennessee, North Carolina, Mississippi, Alabama and Georgia. The present river development consists of nine dams on the main stem. The principal tributaries which have been developed are the Hiwassee, the Little Tennessee, the French Broad, the Holston, and the Clinch Rivers.

The Holston River, with a drainage area of 3,810 square miles has now located on it the Cherokee, Ft. Patrick Henry, Boone, South Holston and Watauga Reservoirs. The French Broad River, with a drainage basin of 5,130 square miles is regulated by Douglas Reservoir. The Clinch River, with a drainage area of 4,400 square miles, is regulated by Norris Dam and Reservoir.

The Little Tennessee River, with a drainage of 2,650 square miles, has built in its watershed Fontana Reservoir and the three Alcoa projects, Thorpe, Nantahala and Santeeplah Reservoirs. One other principal tributary has been developed, the Hiwassee, with a drainage area of 2,660 square miles. On this stream are located Hiwassee, Chatuge, Nottely, Apalachia, Ocoee No. 1 and No. 2, and Blue Ridge dams.

Legislative Background

The Federal Government showed an interest in navigation on the Tennessee River at an early date. In 1824 Secretary of War John C. Calhoun recommended to President Monroe that provision be made for navigation around the Muscle Shoals. In 1828 further recommendation was made to Congress for the improvement at several of the shoals of the river. Since 1852 the Congress has authorized the improvement of the Tennessee River both by open channel and by canalization. At least 13 Rivers and Harbors Acts made provision for the improvement of the river. The project authorized by the last of these, the Act of July 3, 1930, stands on the books as that handed over three years later to the new agency, TVA, for its construction.

The first legislation proposing construction of a hydroelectric power facility at Muscle Shoals was introduced by Rep. Joseph Wheeler on March 21, 1898 and signed into law by President McKinley on March 3, 1899. This gave the consent of Congress to the development of power at or near Muscle Shoals by the Muscle Shoals Power Company. Actually, in this instance, the franchise lapsed and the Company never availed itself of its privilege. In 1903 President Theodore Roosevelt vetoed a similar bill. The next decade saw several pieces of legislation but no actual development of power.

The Tennessee Valley Authority had its real beginning as a World War I project in section 124 of the National Defense Act of 1916. Under this authority President Wilson ordered construction to begin at Muscle Shoals by the erection of Dam No. 2 and its power house and Nitrate Plants Nos. 1 and 2 for the fixation of atmospheric nitrogen, primarily for war purposes and incidentally also for agricultural uses in time of peace.

Disposal of Muscle Shoals Plants

At the end of World War I both nitrate plants and a steam-electric plant had been completed, but only the foundations of Dam No. 2, later known as Wilson Dam, had been installed. Congress refused to make further appropriations for the dam and work was stopped.

No one wanted the dam and the nitrate plants until, in 1921, Henry Ford made an offer to buy both nitrate plants and to lease the water power plant for 100 years, completing the dam and power house. Shortly thereafter the Alabama Power Company also made an offer to complete the dam and power plant at its own expense, to operate it under a 50-year license under the Federal Water Power Act, and to supply power for national defense and for fertilizer production. Immediately, in the views of some Congressmen, the properties became too valuable to be "given away" to private enterprise. Other offers were later made and Mr. Ford withdrew his in 1924.

As early as 1919 legislation was proposed to organize a government-owned corporation to operate the Muscle Shoals properties for the manufacture and sale of fertilizers. Bills similar to that finally enacted in 1933 were passed by Congress in 1928 and in 1930. The first of these met with a pocket veto by President Coolidge. The second was most vigorously rejected by President Hoover.

With the proponents of federal development united and the proponents of private development split between the several offers, Congress could not agree for over a decade.

The Tennessee Valley Authority Act, as passed in 1933, was in many respects similar to the bills that had been vetoed by the preceding two Presidents. An immediate problem requiring legislation was the disposal of the Muscle Shoals properties for some economic use. The record indicates that some of our legislators at the time of the bill's enactment con-

sidered this purpose the principal intent of the legislation and apparently failed to understand fully the true substance of the enactment.

Provisions of TVA Act

The bill HR 5081, approved May 18, 1933, is designated in its section 1 as the Tennessee Valley Authority Act of 1933. The first sentence of the first section states that by the Act there is created a body corporate by the name of the Tennessee Valley Authority for the purpose of maintaining and operating the properties then owned by the United States in the vicinity of Muscle Shoals, Alabama, in the interest of the national defense and for agricultural and industrial development, and to improve navigation in the Tennessee River and to control the destructive flood waters in the Tennessee River and the Mississippi River basins. The law proceeded to spell out in detail the procedures that might or should be followed in organizing the new agency and in executing its business.

In section 4(i) the Authority is given power to acquire real estate for the construction of dams, reservoirs, transmission lines, power houses and other structures; and in section 4(j) authority to construct dams, reservoirs, power houses, power structures, transmission lines, navigation projects and incidental works in the Tennessee River and its tributaries and to unite the various power installations into one or more systems by transmission lines.

In section 5(d) the Board, in order to improve and cheapen the production of fertilizer, is authorized to manufacture and sell fertilizer and fertilizer ingredients at Muscle Shoals by the employment of any process or processes that in its judgment shall appear wise and profitable for the cheapening of the production of fertilizer. Section 5(e) authorized the Board to make donations or sales of its fertilizers through such agencies as the Board may direct for experimentation, education and introduction of the use of such products.

"Surplus Power" Sold

Section 10 authorizes the Board to sell the "surplus power" not used in its operations or for the operation of locks and other works under contracts not exceeding 20 years. Section 12 provides that the Board, either from appropriations made by Congress or from funds secured from the sale of power, or from funds secured by the sale of bonds, may construct, lease, purchase or authorize the construction of transmission lines and to interconnect with other systems. Section 14 provides for the allocation of costs of any dams, steam plants or other similar improvements hereafter constructed and turned over to the Board for control and management.

Section 13 provided for certain payments in lieu of taxes. As later amended, these amount to 5 percent of the gross power revenues except on power sold to U. S. agencies.

Section 15, now expired, authorized a bond issue to provide for the construction of future dams, steam plants or other facilities to be used in whole or in part for the generation or transmission of electric power. Section 17 specifically authorized the construction of the Cove Creek (Norris) Dam, together with a transmission line from Muscle Shoals, including power house and hydroelectric installations and equipment for the generation of power.

Section 23 authorized the President to recommend to Congress such legislation as he might deem proper for bringing about in the Tennessee drainage basin and adjoining territory the maximum amount of flood control, the maximum development of the Tennessee River for navigation, the maximum generation of electric power consistent with flood control and navigation, and other purposes, including the economic and social well-being of the people living in the river basin.

Section 26 provided for the net proceeds from the sale of power and other products manufactured by the corporation to be paid to the Treasurer of the United States at the end of each calendar year.

Congressional Comment

In the hearings before the Committee on Military Affairs, held just prior to passage of the Act, the sponsor of the bill reported by the House of Representatives, the Honorable Lister Hill, testified: "I might state this for the purpose of making the information available for the record, that this Bill provides for the development of the entire Tennessee River; that is, the construction of all those power dams on that river."

House Report 48 of the 73rd Congress, favorably recommending the legislation to the House of Representatives, said that after construction of two dams specifically named in the bill "no other dam will be constructed unless there is a reasonable market demand for so much of the power as will yield a reasonable return on that part of the investment representing the cost of power production. This puts future power development upon a business basis."

Government Competition Foreseen

The minority, however, in the same report said that they were "unable to approve HR 5081 . . . because it compels the Government to engage in the production and the sale of power and fertilizer in competition with its citizens. . . ." This minority report went on to say: "It will be seen that the Bill effectually conceals its real purposes and commits the country to the expenditure of vast sums of money. . . ."

It would appear that notwithstanding the omission of reference to electric power in the title of the bill or in the stated purposes in section 1, the sponsors of the bill and both the majority and minority of the Committee reporting the bill clearly interpreted the legislation as calling for an expenditure of great amounts of money beyond those specifically set forth in the legislation for the development of hydroelectric power in the Basin and for the acquisition of steam plants and transmission lines.

Amendments

On August 31, 1935 an amendment to the TVA Act was approved that extended the general power to construct dams, reservoirs, power houses, power structures, transmission lines and navigation projects so as to provide specifically for a nine-foot channel, the depth authorized for navigation in the 1930 River and Harbor Act that had adopted the project recommended by the Corps of Engineers in House Document 328, 71st Congress, 2nd Session. The authority was also extended to authorize the Board to acquire, as well as construct, power houses, power structures, transmission lines, and so on.

This amending Act also added a new section 9(a) authorizing the Board to provide and operate facilities for the generation of electric power at any of its dams, in order to avoid the waste of water power.

The 1935 amendment also amended section 10 to authorize the Board of Directors to specify resale rate schedules in any contract for the sale of power and to acquire existing electric facilities used in serving farms and small villages. This Act authorized an additional bond issue to provide funds for loan to local groups to acquire, improve or operate existing electric distribution facilities. It also changed section 26 so as to eliminate broad authority originally granted for the use of proceeds from the sale of power for "new construction," and limited the use of such funds except to use which in the opinion of the Board was necessary in the operation of dams and reservoirs in conducting its business in generating, transmitting and distributing electric energy and in manufacturing, selling and distributing fertilizer.

The 1935 Act also added section 31, providing that the legislation "be liberally construed to carry out the purpose of Congress."

Private Plants Purchased

In 1939 the legislation was further amended to authorize an additional bond issue to provide funds for a purchase by TVA of certain properties of the Commonwealth and Southern Corporation and its subsidiaries, the Tennessee Electric Power Company and the Southern Tennessee Power Company. The subsequent purchase eliminated what the Senate Report had referred to as destructive competition damaging and injurious both to the Tennessee Valley Authority and to the private owner of the properties purchased. By thus eliminating the investor-financed utility in the area, it must be concluded that Congress intended either that TVA assume a utility responsibility or that the former customers of Commonwealth and Southern Corporation be left without any electric supplier responsible to continue service.

In 1941 an amendment to the Act was adopted which indicated that TVA was subject to certain review by the General Accounting Office from which it had previously believed itself exempt. The Government Corporation Control Act, adopted December 6, 1945, required the TVA, as a wholly-owned government corporation, to submit an annual business-type budget in a certain prescribed form.

In 1948 the Government Corporations Appropriation Act provided that TVA would be required to repay to the Treasury a portion of its investment allocated to power, such that in a ten-year period 25 percent of the investment would be repaid and that in a similar fashion additional investments would be repaid in a period not exceeding 40 years. This repayment called for return of capital without interest.

PHYSICAL PLANT AND ITS COST

Financing TVA

As of June 30, 1957, over 3½ billion dollars had been expended by TVA in its development and operations. Congressional appropriations to that date had totalled $1,931,124,581. In addition, $65,072,500 had been raised by the sale of bonds and $45,203,448 was carried on the books as the value of properties transferred to TVA from other federal agencies.

The funded debt had been repaid, as well as $175,059,019 of other monies derived from the Treasury and invested in the power program. An additional $37,776,997 was derived by TVA from other sources during the quarter century of its operations, bringing total payments to the Treasury to $277,908,515. The net amount of funds available for expenditure from Treasury sources thus totalled $1,763,592,027.

In addition to these amounts, gross receipts from the sale of power amounting to $1,474,375,192 were available to TVA. Net power proceeds amounted to roughly 28 percent of the gross revenue, leaving something in the nature of $1,060,000,000 expended in the service area for the production and transmission of electric power.

An additional operation, the development of fertilizer and munitions, has involved an outlay of fifteen to twenty million dollars annually in recent years. The production and distribution activities, as reported by TVA on the basis of its accounting procedure, have been self-supporting and generally have made some contribution to research and test costs which are not considered a part of production expense.

The foregoing figures give a general impression of the magnitude of the operation of the Tennessee Valley Authority. More detailed consideration of figures will be given in the examination of the different programs.

Table 1 shows the derivation of assets of TVA as of June 30, 1957, as reported by the TVA comptroller on October 1, 1957. Table 2 lists the appropriations made available to TVA by Congress.

The original law required only that TVA power activities be "self-supporting and self-liquidating." Flood control, navigation and resource development activities are operated as regular government functions supported by tax funds. The fertilizer and munition program, in the net, involves the use of some tax funds. The power program, according to the agency's reports, has earned a rate of return in recent years as indicated by the figures in Table 3.

Return of the Investment

In fiscal years 1946 and 1947, some $23,600,000 was repaid to the Treasury of the United States under the procedure set forth in Section 26 of the basic act. Starting with fiscal year 1948, payments as prescribed by the Corporation Control Act amendment have been made annually. The amounts required to be paid to the Treasury equal the appropriated funds invested in power facilities and are to be repaid within 40-year periods after the facilities go into operation. These amounts are credited as repayments of the Treasury investment in power.

Table 4 shows the record as of June 30, 1957. The repayments are currently ahead of the schedule required by law. However, these repayments do not include interest and do not involve the investment of capital obtained from power revenues.

If power revenues not needed for the operation had been paid back to the Treasury under the procedure set forth in Section 26, then additional funds would have been needed for capital expansion and these, it can be assumed, would have been provided through the appropriation process. It appears, then, that in equity to the taxpayer and to the Treasury, no distinction should be made between the treatment of revenues used for capital expansion and the appropriations so used. Thus the reinvested revenues should be repaid on the same basis as are appropriations.

As noted above, TVA reports an average "return" of approximately four percent annually on its power investment. This figure and the amounts of payments to

TABLE 1

TVA DERIVATION OF ASSETS

(As Reported by TVA October 2, 1957)

	Power program	*Nonpower programs*	*Total*
ASSETS:			
Unexpended proceeds from operations	$ 55,172,382	$ 4,335,821	$ 59,508,203
Unexpended appropriations	.....	30,178,870	30,178,870
Inventories	35,613,445	6,523,747	42,137,192
Completed plant less accumulated depreciation	1,467,429,852	335,429,663	1,802,859,515
Construction and investigations	56,661,276	10,443,410	67,094,686
TOTAL	1,614,876,955	386,901,511	2,001,778,466
DERIVED FROM:			
Appropriations	1,356,547,891	574,576,690	1,931,124,581
Property transfers	19,382,954	25,920,507	45,303,461
Bond proceeds	65,072,500	.....	65,072,500
	1,441,003,345	600,497,197	2,041,500,542
LESS:			
Payments into General Fund of U. S. Treasury	175,059,019	37,776,996	212,836,015
Bond redemptions	65,072,500	.....	65,072,500
Net expense of nonpower programs	.....	175,818,690	175,818,690
	240,131,519	213,595,686	453,727,205
Net U. S. Treasury funds:			
Employed in programs	1,196,133,914	346,289,231	1,542,423,145
Construction and investigations	4,737,912	10,433,410	15,171,322
Unexpended appropriations	.....	30,178,870	30,178,870
	1,200,871,826	386,901,511	1,587,773,337
NET POWER INCOME:			
Employed in program	361,506,995	.....	361,506,995
Construction and investigations	51,923,364	.....	51,923,364
	413,430,359	.....	413,430,359
REVENUES COLLECTED in advance and contributions in aid of construction	574,770	.....	574,770
TOTAL	$1,614,876,955	$386,901,511	$2,001,778,466

TABLE 2

TVA APPROPRIATED FUNDS AVAILABLE

(Through December 31, 1957)

Allocated from NIRA funds (4th Deficiency Act of June 16, 1933)	$ 50,000,000
Emergency Appropriation Act Approved July 9, 1934	25,000,000
Second Deficiency Appropriation Act, August 12, 1935	36,000,000
First Deficiency Appropriation Act, June 22, 1936	39,900,000
Second Deficiency Appropriation Act, May 28, 1937	40,166,270
Independent Offices Appropriation Act, May 23, 1938	40,000,000
Independent Offices Appropriation Act, March 16, 1939	39,003,000
Independent Offices Appropriation Act, April 18, 1940	40,000,000
Supplemental Appropriations Act, July 31, 1940	25,000,000
Independent Offices Appropriation Act, April 5, 1941	79,800,000
Supplemental Appropriations Act, July 16, 1941	40,000,000
Third Supplemental National Defense Appropriation Act, December 17, 1941	47,000,000
Fourth Supplemental National Defense Appropriation Act, January 30, 1942	30,000,000
Independent Offices Appropriation Act, June 27, 1942	136,100,000
Independent Offices Appropriation Act, May 3, 1945	9,648,000
Government Corporations Appropriation Act, July 20, 1946	39,906,000
Government Corporations Appropriation Act, July 30, 1947	18,700,000
Government Corporations Appropriation Act, June 30, 1948	27,389,061
First Deficiency Appropriation Act, May 24, 1949	2,950,000
Second Deficiency Appropriation Act, August 24, 1949	49,359,150
Urgent Deficiency Appropriation Act, March 27, 1950	11,682,500
General Appropriation Act, September 6, 1950	102,714,000
Supplemental Appropriation Act, September 27, 1950	28,500,000
Second Supplemental Appropriation Act, January 6, 1951	66,500,000
Independent Offices Appropriation Act, August 31, 1951	238,389,600
Supplemental Appropriation Act, November 1, 1951	−3,000,000
Independent Offices Appropriation Act, July 5, 1952	186,027,000
Supplemental Appropriation Act, July 15, 1952	150,000,000
Second Independent Offices Appropriation Act, July 7, 1953	188,371,000
	175,000
	−66,000
Independent Offices Appropriation Act, June 24, 1954	120,000,000
Public Works Appropriation Act, July 15, 1955	27,053,000
Public Works Appropriation Act, July 2, 1956	5,357,000
	−6,500,000
TOTAL TO JUNE 30, 1957	$1,931,124,581
Supplemental Appropriation Act, AUGUST 28, 1957	13,317,000*
TOTAL APPROPRIATED FUNDS	$1,944,441,581

* This item *not* included in other tables as statements generally closed with the end of fiscal year 1957 (June 30, 1957).

TABLE 3

TVA'S REPORTED RATE OF RETURN

Fiscal year	*Percent*
1949	5.0
1950	5.8
1951	5.4
1952	4.7
1953	2.7
1954	3.2
1955	4.2
1956	3.9
1957	4.0

NOTE: Percent return is after depreciation and actual payments to state and local governments in lieu of taxes.

the Treasury made by TVA under the requirement of law, both have led to considerable confusion in the representation of TVA's financial condition.

Extreme partisan supporters of the agency point to the "return" figure and to the payments to the Treasury as evidence: first, that TVA is self-supporting; second, that it makes a payment to the federal government for amortization of the investment; third, that, in response to the charge that TVA pays no taxes, the amounts are payments to the federal government which is what taxes are; and fourth, that in response to the charge that TVA pays no interest, the four percent is interest. It should be obvious that the return can in propriety be counted only once and cannot in turn be called profit, taxes, interest, and amortization.

Considering only payments to the Treasury made by TVA and its reported outstanding investment in power, these payments, as percentage of investment figures for the last 10 years, are shown in Table 4.

As another measure of the merits of TVA as an investment for taxpayers, Table 5 presents figures considering the annual payments to the Treasury made since 1948 as a return on investment. For the sake of the computation, the payments have not been considered as credits to the Treasury's investment in power, but merely returns on that investment. The investment shown in the table is that which has been

TABLE 4

TVA PAYMENTS TO U. S. TREASURY

(Power Facilities)

	Investment of Treasury funds	*Payments to Treasury*	*Balance at end of year*	*Payment as percentage of outstanding balance*
TOTAL TO June 30, 1947	$ 371,870,759	$ 23,631,519	$ 348,239,240	...
FISCAL YEAR ENDED June 30:				
1948	.....	10,500,000	337,739,240	3.0
1949	.....	5,500,000	332,239,240	1.6
1950	17,745,840	5,500,000	344,485,080	1.7
1951	23,373,731	9,000,000	358,858,811	2.6
1952	100,893,844	12,000,000	447,752,655	3.3
1953	209,046,402	15,000,000	641,799,057	3.4
1954	164,415,676	20,000,000	786,214,733	3.1
1955	254,366,425	50,000,000	990,581,158	6.4
1956	196,225,257	59,000,000	1,127,806,415	6.0
1957	98,327,499	30,000,000	1,196,133,914	2.7
TOTALS TO June 30, 1957	$1,436,265,433	$240,131,519	$1,196,133,914	...

NOTE: Of the total payments, $65,072,500 has been applied in liquidation of funded debt and the remaining $175,059,019 paid into the General Fund of the Treasury.

TVA reports that additional payments totalling $37,776,996 have been made to the Treasury from nonpower proceeds, bringing the aggregate of payments into the General Fund to $212,836,015 and the aggregate of all payments to $277,908,515 as of June 30, 1957.

made in power with appropriations from the Treasury. The percentage figure, then, represents the return that has been made to the taxpayer and which is available in lieu of federal taxes and as interest on the investment.

Treasury Interest Cost

In only six years since 1948 has the repayment exceeded the computed annual interest rate on marketable Treasury issues. At this computed annual interest rate (that is, all issues, not just long-time loans), interest costs on the Treasury investment of appropriated funds in TVA power have amounted to approximately $170,130,000, as detailed in Table 6, over this 10-year period when $216,500,000 was repaid into the Treasury.

Thus, while under the law the payments have been credited with reducing the capital investment by $216,500,000, interest equal to almost 80 percent of this

TABLE 5

TVA PAYMENTS TO TREASURY CONSIDERED AS PERCENTAGE OF TOTAL TREASURY INVESTMENT IN POWER

(1948–1957)

Year	*Cumulative investment of Treasury funds*	*Payment*	*Percent*
1948	$ 371,870,759	$ 10,500,000	2.83
1949	371,870,759	5,500,000	1.48
1950	389,616,599	5,500,000	1.41
1951	412,990,330	9,000,000	2.18
1952	513,884,174	12,000,000	2.34
1953	722,930,576	15,000,000	2.08
1954	887,346,252	20,000,000	2.26
1955	1,141,712,677	50,000,000	4.38
1956	1,337,937,934	59,000,000	4.42
1957	1,436,265,433	30,000,000	2.09
Total	.....	$216,500,000	....

TABLE 6

MINIMUM INTEREST COST ON TREASURY INVESTMENT IN TVA POWER

(1948–1957)

Year	*Cumulative investment of Treasury funds*	*Treasury interest Rate for year*	*Interest cost*
1948	$ 371,870,759	1.942	$ 7,220,000
1949	371,870,759	2.001	7,450,000
1950	389,616,599	1.958	7,650,000
1951	412,990,330	1.981	8,200,000
1952	513,884,174	2.051	10,520,000
1953	722,930,576	2.207	15,970,000
1954	887,346,252	2.043	18,100,000
1955	1,141,712,677	2.079	23,720,000
1956	1,337,937,934	2.427	32,500,000
1957	1,436,265,433	2.707	38,800,000
Total	.....	.....	$170,130,000

amount was paid by the Treasury, under the most favorable calculations (to TVA) that can be used.

Actually, then, regardless of how the law permits returns to be counted, there has been a repayment to the Treasury of only about $46.5 million over and above average interest costs to the Treasury during the last 10 years. This makes no account of interest during the first 15 years of the agency's operations; no account of contribution to the federal government in the nature of, or in lieu of, taxes; no account of the adequacy of payments to states and local governments in lieu of taxes; and obviously no account of a residue to be considered as profit to the federal government or to the federal taxpayer.

This completes the outline of investment and return, as they have actually been experienced. A later section of this report is devoted to an estimate of what costs have been omitted and the extent to which the power operation of TVA can properly be considered subsidized by the taxpayer.

WATER AND POWER DEVELOPMENT

Navigation

One of the purposes of the Tennessee Valley Authority, as specifically set forth in the first section and in the first four words of the title of the Act, is to improve the navigability of the Tennessee River. The 1935 amendment provided specifically for a nine-foot channel in the river from Knoxville to its mouth at the Ohio River.

The River and Harbor Act of July 3, 1930 had authorized the permanent improvement of the river for a navigable depth of nine feet at low water from the mouth to Knoxville, a distance of about 652 miles. The estimated cost of the authorized project as set forth in House Document 328 of the 71st Congress was $74,709,000. The justification of an expenditure of that amount was premised on these assumptions:

(1) That approximately 4,663,000 tons of commerce moving to, from, and across the basin by rail would be diverted to the river, bringing the total commerce to 6,645,000 tons annually; and

(2) That growth of the basin and further diversion of traffic from rail transportation would increase the waterway tonnage to 15,300,000 tons per annum by 1950.

As reported in its 1956 Annual Report, Tennessee Valley Authority has allocated $159,112,197 of its capital expenditures to improvements for navigation, a sum more than double the original cost estimate.

Estimates Not Met

On the basis of total tonnage figures (Table 8), traffic on the Tennessee River had fallen to less than 50 percent of the 1926 level by the time the TVA Act was passed. It was 1940 before total traffic was once again at the level of 1926, the time the survey was made by the Corps of Engineers. It was not until 1953 that the tonnage originally estimated to be expected upon completion of the project was reached, and the figure predicted for 1950 has not yet been reached.

Adverse as is this superficial appraisal of total tonnages, it leads to an exaggerated picture of the growth of river traffic. In 1926 somewhat more than one and a half million tons of the less than two million tons of total traffic on the river was made up of sand, gravel and stone. The average length of this haul was 3.8 miles. Obviously, this movement constituted essentially a mining operation rather than a transportation operation. The sand and gravel dredged from the river were taken by barge to the dredgers' docks at the river's edge and then transshipped for construction use.

The 1926 assumption that a saving of $1,300,000 resulted from shipping sand and gravel by barge rather than by rail seems absurd. The material could not have been transported by rail from the river to the shore.

Sand and gravel have been gathered from the river continually up to the present, with the volume dropping as low as 742,000 tons in 1939 and rising as high as 2,628,000 tons in 1941. For 1956 the total volume was 2,162,348 tons.

The average length of haul increased from 3.8 miles in 1926 to 13.7 miles in 1933 and to 23.6 miles in 1955. Yet in all propriety consideration of the Tennessee River as a transportation facility should eliminate inclusion of sand and gravel moved from the river bed, where it is gathered, to the shore. While it is reported that the miners now use six-foot draft barges instead of two-foot draft barges, as formerly, and hauls are somewhat larger, the operation is still a mining operation. Presumably, approximately the same quantity would have been harvested whether or not the river had been improved for navigation. Tennessee Valley Authority estimates of transportation savings include 15¢ for each ton of sand and gravel moved from river shoals and reported in the commercial statistics.

Coal Destined for TVA Plants

A second item of river cargo calls for particular examination. This is the item classified as "coal and coke." In 1955, for example, more than 84 percent of the 5,662,000 tons shipped was destined for TVA installations, that is, for steam power plants. This coal and coke destined for TVA plants comprised more than 58 percent of the total river traffic exclusive of sand and gravel movements.

TABLE 7

TENNESSEE RIVER FREIGHT TRAFFIC

(Tons)

Year	*Chemicals*	*Coal & coke*	*Forest products*	*Grain & products*	*Iron & steel*	*Petroleum products*	*Stone, sand & gravel*	*All others*	*Total*	*Year*
1933	.....	[a]	84,855	[a]	[a]	.....	814,066	41,302	940,223	1933
1934	.....	[a]	103,222	[a]	[a]	[a]	1,328,962	62,514	1,494,698	1934
1935	.....	[a]	111,042	[a]	34,929	.....	1,598,664	154,702	1,899,337	1935
1936	[a]	[a]	171,010	[a]	13,791	[a]	1,853,968	127,628	2,166,397	1936
1937	.....	[a]	209,943	[a]	24,201	[a]	1,041,807	101,156	1,377,107	1937
1938	[a]	[a]	131,859	[a]	33,741	62,568	756,099	79,547	1,063,814	1938
1939	[a]	[a]	128,219	[a]	28,356	103,346	742,455	112,837	1,115,213	1939
1940	.....	[a]	141,862	43,140	20,631	102,882	1,842,093	56,305	2,206,913	1940
1941	[a]	[a]	166,895	85,237	26,257	115,353	2,628,316	71,608	3,093,666	1941
1942	.....	183,320	145,567	91,361	32,251	204,811	2,119,311	59,984	2,836,605	1942
1943	.....	321,602	106,006	123,365	179,774	146,795	1,873,645	118,031	2,869,218	1943
1944	.....	315,143	80,493	113,642	25,265	172,743	1,603,147	37,234	2,347,667	1944
1945	.....	505,299	62,931	122,861	17,528	215,617	1,198,289	40,879	2,163,404	1945
1946	[a]	223,233	87,392	78,301	6,283	349,141	1,597,396	57,504	2,399,250	1946
1947	[a]	387,718	61,345	84,763	3,609	326,789	1,836,099	92,104	2,792,427	1947
1948	[a]	472,395	51,502	62,754	8,973	491,934	1,777,797	97,909	2,963,264	1948
1949	[a]	343,653	54,422	105,099	61,402	608,647	1,495,328	98,294	2,766,845	1949
1950	[a]	207,151	29,332	160,709	117,045	754,259	1,657,119	125,547	3,051,162	1950
1951	[a]	513,876	44,031	157,820	60,003	716,850	2,095,684	160,322	3,748,586	1951
1952	21,126	1,884,937	[a]	204,387	138,434	812,699	2,536,751	239,188	5,837,522	1952
1953	44,722	2,941,071	[a]	353,036	237,600	740,029	2,518,921	283,848	7,119,227	1953
1954	67,915	4,832,259	[a]	389,828	218,181	786,767	1,807,076	313,743	8,415,769	1954
1955	111,230	5,661,931	111,957	595,149	224,512	914,762	1,873,690	481,776	9,975,007	1955
1956	294,754	7,473,849	109,232	649,772	292,977	826,252	2,162,348	490,212	12,299,396	1956

[a] Included in All Others.

SOURCE: Based on statistical data of the Corps of Engineers, Department of the Army.

TABLE 8

TENNESSEE RIVER FREIGHT TRAFFIC

(Tons)

Year	*Total*	*Sand, gravel & stone*	*Total excluding sand, gravel & stone*	*TVA traffic*[1]	*Total adjusted*[2]
1926	1,982,252	1,560,695	421,557	.....	.....
1933	940,223	814,066	126,157	.....	.....
1934	1,494,698	1,328,962	165,736	.....	.....
1935	1,899,337	1,598,664	300,673	.....	.....
1936	2,166,397	1,853,968	312,429	.....	.....
1937	1,377,107	1,041,807	335,300	.....	.....
1938	1,063,814	756,099	307,715	.....	.....
1939	1,115,213	742,455	372,758	.....	.....
1940	2,206,913	1,842,093	364,820	.....	.....
1941	3,093,666	2,628,316	465,350	.....	.....
1942	2,836,605	2,119,311	717,294	.....	.....
1943	2,869,218	1,873,645	995,573	.....	.....
1944	2,347,667	1,603,147	744,520	.....	.....
1945	2,163,404	1,198,289	965,115	.....	.....
1946	2,399,250	1,597,396	801,854	.....	.....
1947	2,792,427	1,836,099	956,328	298,460	657,868
1948	2,963,264	1,777,797	1,185,467	443,358	742,109
1949	2,766,845	1,495,328	1,271,517	273,742	997,775
1950	3,051,162	1,657,119	1,394,043	218,661	1,175,382
1951	3,748,586	2,095,684	1,652,902	529,776	1,123,126
1952	5,837,522	2,536,751	2,300,771	1,904,750	1,396,021
1953	7,119,227	2,518,921	4,600,306	2,857,560	1,752,746
1954	8,415,769	1,807,076	6,608,693	3,926,370	2,682,323
1955	9,975,007	1,873,690	8,101,317	4,785,231	3,316,086
1956	12,299,396	2,162,348	10,137,048	6,478,375	3,658,673

[1] Percentage of this tonnage coal and coke:—1950, 88.8%; 1951, 95.5%; other years over 97.5%.
[2] Excludes sand, gravel and stone and TVA traffic.

SOURCES: TVA, Navigation Economics Branch; Corps of Engineers statistics on Waterborne Commerce.

Thus, classed as a *national* benefit is the movement of coal over a federal waterway destined for use to produce subsidized electric energy for a local area. If TVA is to count the lower navigation cost as a benefit, it might well, in full propriety since the navigation has been provided with federal funds, have a compensating increased charge in its power operations for that portion of the river improvement dedicated to the movement of coal for power production.

Industry often finds it sufficiently advantageous to warrant its expenditure of funds for channel improvement. The United States Steel Corporation deepened the Orinoco River in Venezuela to 26 feet at its own cost in order to facilitate the removal of iron ore from

Venezuela for shipment to steel furnaces in the United States. No cost for improving the river was levied against the citizens of Venezuela, under the theory that the movement of the material (at a cost less than would have been experienced by rail) was a benefit to the people of that country. The benefit obviously accrued exclusively to the shipper.

Likewise, the benefit of moving coal over the Tennessee River to the steam electric plants of the Tennessee Valley Authority is a benefit that accrues exclusively to the TVA as a manufacturer of electric energy. At best the benefit is passed on only to the power users and not to the entire taxpaying citizenry. However, TVA's special benefits in this instance are akin to those received by investor-financed electric power companies which barge coal without charge over the navigable waterways network of the United States.

Excluding sand and gravel and shipments (primarily coal) destined for TVA consumption, the remaining traffic over the Tennessee River waterway in 1956 totalled 3,658,673 tons. This figure compares with the 4,500,000 tons originally reported as a reasonable amount to be diverted to the river from 1926 rail traffic. Obviously, navigation traffic on the river has not built up in accordance with the prospectus furnished Congress a quarter of a century ago.

Benefits vs. Costs

A standard error in the customary practice of determining benefits from a waterway improvement is the basing of computations on differences in rates rather than on differences in costs. The saving assumed to accrue to the project is the difference in rate for shipping via water and that for shipping by rail or some comparable method. Such savings, or benefits, so-called, can be changed rapidly by changes in tariffs of the carriers. TVA calculations include this same basic error but actually go a step further. There is no standard of rates for comparing shipments, such as the coal moving to TVA plants. Current rail rates are competitive with water rates and combined rail-water rates for the same commodity. A comparison of two such rates gives little or no dollar value for computing savings. Accordingly, in computing benefits TVA compares with the existing water rate an artificial rail rate which it assumes might probably have existed if no waterway improvement had been made. On this basis TVA estimates savings to shippers in 1956 at $20,000,000.

When computations of this kind are made, when traffic includes sand and gravel mining, and when goods for self-consumption are included, the advantage of every doubt is credited to the waterway and a high benefit figure is built up.

On the other hand, in arriving at a figure of annual costs to compare with annual benefits, TVA uses a conservative approach. No interest is charged on the investment and the capital investment is not amortized, even though a figure for depreciation is included.

The Board of Investigation and Research, established by Congress in 1940 to determine annual waterway costs, included a charge of 3.5 percent for interest on and 0.77 percent for amortization of invested capital in addition to other expenses.[1] Computing annual costs on this basis and adding the direct and common costs reported by TVA excluding depreciation, and costs to the Department of Army and the Coast Guard, the total comes to $9,260,620. As computed by TVA methods, 1957 annual costs were $3,832,829. (Table 9)

Conclusions

The foregoing should show that actual costs are higher and benefits lower than are commonly reported. It is possible, therefore, that some portion of the capital costs allocated to navigation improvement should more properly be borne by some other feature, such as power. The navigation project has cost more than originally predicted, and the traffic has not developed as rapidly as originally forecast.

Flood Control

One of the major purposes of the Tennessee Valley Authority development has been the reduction of flood damage. In the case of the Tennessee River, flood damage abatement by the works built and operated by TVA has actually been in the nature of flood control. The reservoir system has been used to regulate the river flow. The records show that benefits in lowered flood stages have been produced in each of 30 floods that have occurred since the completion of Norris Dam.

Five of the main stream dams and ten of the tributary reservoirs have been specifically intended to provide flood storage. In addition, all nine main river dams have been operated with due regard to flood flows and the minimizing of their adverse effects.

Costs allocated by TVA to flood control total $184,092,841 as of June 30, 1957.

In addition to the benefits provided by the management of the flood-control reservoirs, some incidental

[1] H. Doc. 159, 79th Congress, 1st Session.

TABLE 9

ANNUAL NAVIGATION COSTS—TENNESSEE RIVER

Fiscal year	TVA				Dept. of Army	Coast Guard	Total costs
	Direct	Common	Depreciation	Total			
1933	$.....	$ 1,230	$.....	$ 1,230	$221,181	$.....	$ 222,411
1934	1,728	130,067	39,891	171,686	187,066	.....	358,752
1935	3,636	140,600	39,891	184,127	359,593	.....	543,720
1936	11,691	158,997	39,891	210,579	298,749	.....	509,328
1937	3,049	275,771	56,353	335,173	258,958	.....	594,131
1938	8,133	172,967	250,770	431,870	305,470	.....	737,340
1939	76,708	236,022	343,724	656,454	456,655	.....	1,113,109
1940	119,656	274,229	461,965	855,850	463,976	.....	1,319,826
1941	112,606	330,287	550,222	993,115	374,499	100,000	1,467,614
1942	114,927	367,080	593,701	1,075,708	367,523	100,000	1,543,231
1943	170,877	471,637	666,593	1,249,107	372,035	150,000	1,771,142
1944	220,490	581,945	786,783	1,589,218	380,568	150,000	2,119,786
1945	200,826	731,991	1,182,164	2,114,981	335,796	200,000	2,650,777
1946	217,891	1,035,667	1,273,791	2,527,349	433,649	200,000	3,160,998
1947	273,944	1,384,463	1,297,582	2,955,989	386,081	200,000	3,542,070
1948	272,687	1,160,091	1,277,551	2,710,329	506,319	250,000	3,466,648
1949	283,993	1,213,653	1,285,439	2,783,085	760,920	250,000	3,794,005
1950	287,530	1,185,005	1,323,910	2,796,445	744,387	250,000	3,790,832
1951	296,040	1,051,469	1,310,790	2,658,299	624,630	300,000	3,582,929
1952	349,100	1,006,845	1,314,508	2,670,453	599,614	300,000	3,570,067
1953	306,954	992,062	1,320,326	2,619,342	719,608	300,000	3,638,950
1954	310,758	1,059,991	1,355,241	2,725,990	636,009	300,000	3,661,999
1955	296,756	1,157,666	1,365,808	2,820,230	769,436	300,000	3,889,666
1956	257,583	1,047,268	1,376,579	2,681,430	747,961	300,000	3,728,391
1957	213,182	1,153,347	1,378,845	2,745,374	787,455	300,000	3,832,829

NOTE: Net navigation investment 1933–36 inclusive does not include common capital costs.

SOURCES: TVA and Coast Guard costs from TVA sources; Army costs from annual reports of the Chief of Engineers.

advantage accrues as a result of the existence of the ten tributary reservoirs and dams constructed for the development of electric power.

Floods in the Tennessee River basin are essentially seasonal, and the high flows have occurred generally between mid-December and mid-April. The maximum drawdown of the single-purpose reservoirs occurs approximately between mid-October and the 1st of March. This overlaps the flood season, and as a result there is some benefit in the reduction of flood damage. A similar benefit can be expected from nearly any reservoir system even when not deliberately operated for flood control.

Control by Permanent Flooding

The Corps of Engineers reported in House Document 328, 71st Congress, that 666,154 acres might be flooded in the 500-year frequency flood. TVA reservoirs have a lake area of 602,000 acres. TVA has acquired 532,675 acres below maximum shoreline elevation and has acquired flowage easements on 174,467 acres of additional land.

Flood benefits from the Tennessee Valley Authority improvements occur primarily in the Tennessee River basin but also are noticeable on the Ohio and Mississippi Rivers below the mouth of the Tennessee. Chattanooga is the principal flood damage center in the Tennessee Basin. The drainage area above Chattanooga is 21,400 square miles, or approximately one-half of the entire drainage area of the Tennessee River.

Records indicate that a flood which occurred in February 1957 probably would have resulted in a flood stage 22 feet higher at Chattanooga if the reservoir system had not been installed and operated for river control. Actually, the stage exceeded the Weather Bureau flood mark by only two feet, and the adverse effects of overflow were definitely limited.

The Tennessee Valley Authority estimates that flood damage was reduced by $65,000,000 through its control of the 1957 high water. This appraisal of the possible damage is based entirely upon estimates by TVA. It is derived from data collected in a survey of the potential flood area and periodically revised in light of economic and developmental changes. It appears to be a reasonable approach to the problem.

There is a serious danger inherent in public complacency growing out of the beneficial operations undertaken since the completion of Norris Dam. The reservoirs give only partial protection to the city of Chattanooga. The Corps of Engineers has recommended the construction of a levee system to give full protection, and it has been authorized by Congress. Consideration of the levee project is not pertinent to this study beyond pointing out that additional flood protection works are needed at Chattanooga and Rossville.

Downstream Benefits Claimed

Computations indicate that benefits probably occurred at Cairo, Illinois, in the 1937 flood as a result of TVA reservoirs. An exact appraisal of the benefit is impossible. The Mississippi River Commission has estimated that the present Tennessee River reservoirs could be operated so as to reduce a flood of the magnitude and characteristics of the 1937 Ohio River flood by about two feet at Cairo.

The Commission also considered that Tennessee River operations reduced the flood stage in 1950 immediately below Cairo sufficiently to prevent use of the new Madrid Floodway. This Floodway would go into operation by the crevassing of a fuse plug levee, thus diverting flood flow through the Floodway and relieving pressure on downstream levees. Although the United States Government owns flowage rights across the Floodway, the land has been occupied and is in use for productive purposes. Diversion of flow over the Floodway would cause some physical damage. However, it is not proper to give economic credit for any savings to other federal works (such as TVA dams) because the Floodway costs have been charged to Mississippi River flood-control projects.

The Tennessee Valley Authority has estimated the annual benefits from the flood control provided by its system as follows: Chattanooga $2,500,000; balance of Tennessee River basin $593,000; Mississippi and Ohio Rivers $5,870,000; total $8,963,000.

The Corps of Engineers, on the other hand, in furnishing its estimates of benefits to the Federal Power Commission for use in a cost-allocation study, gave estimates as follows: Chattanooga $4,978,000; balance of Tennessee River basin $594,000; Ohio and Mississippi River basins $3,840,000; total $9,412,000. The benefits at Chattanooga are based on the assumption that the recommended and authorized levee system will be added.

It would appear that TVA's estimates of benefits might be the more acceptable for the Tennessee Basin. The estimate by the Corps of Engineers of TVA's works appears more realistic for the areas in the Ohio and Mississippi Basins. Selecting the figures in this way gives an average annual flood-control benefit of $6,933,000. Amortizing the capital investment in TVA

flood control ($184,092,841), at 3 percent over a 50-year period, amounts to $7,150,000 annually. Adding to this the annual operating costs reported by TVA for 1957 ($1,405,025), the total annual cost chargeable to flood control would be $8,555,025. Thus, the ratio of benefits to cost is approximately 0.8. Under accepted procedures, this project would not be considered economically justified. In reference to a multiple purpose project, this ratio seems rather to indicate that too large an amount of the cost has been assessed against flood control.

Benefits Duplicated

Examination of the benefits, however, should not stop here. The Task Force on Water Resources and Power of the Commission on Organization of the Executive Branch of Government (Second Hoover Commission), that operated from November 1953 to June 1955, made a study of the use of lower Mississippi River flood-control benefits by the Corps of Engineers in the justification of tributary reservoirs. This unpublished study, now filed in the National Archives, is referred to on pages 805 and 806 of the published Task Force Report.

This study found, among other things, that the Mississippi River levees were designed to have a one-foot freeboard above the project design flood and that the Corps of Engineers considers a three-foot freeboard desirable to provide an adequate factor of safety. Since it is not practicable to raise the levees, tributary reservoirs in the Mississippi River basin are expected to provide the extra two feet of freeboard by lowering the project flood. Dollar benefits of providing this two-foot lowering are estimated to be worth $5.4 million annually. This is the total annual value that can be credited to all flood crest lowering because with the levees in place there is apparently no economic justification for attempting to reduce the project flood more than three feet below the top of the levees.

In computing average annual flood-control benefits assignable to Mississippi River reservoirs, a total benefit of $14,589,600 was allocated to 112 projects excluding those in the Tennessee River basin. Since the maximum benefit is only $5.4 million, it is obvious that some change in computation is necessary to eliminate the $9.2 million exaggeration.

Now while the total benefit of upstream reservoirs on the Mississippi River amounts to $5,400,000, the TVA has estimated the benefits from its system alone to the Mississippi to be $5,870,000. The Corps of Engineers has estimated the value of the TVA system to the lower Mississippi as $3,600,000 annually. Taking the lower of the two figures, $3,600,000, and adding it to the benefits assigned to 112 other reservoirs in the Corps of Engineers' system, a total benefit of $18,189,600 is obtained when the maximum apparently should be only $5,400,000.

Conclusions

An accurate determination of the effects of the Tennessee River reservoirs on the lower Mississippi flood-control system and the resulting benefits is not possible. Available figures indicate that present estimates are high and are sufficiently out of line as to indicate that costs of the TVA system allocated to flood control are excessive. A proportionate reduction would cut the TVA system benefits by approximately $2.5 million, leaving a benefit of approximately $4,400,000 to compare with an annual cost of $8,555,000.

This analysis points out that the TVA allocation of capital investment to flood control is as much as $100 million too high.

Fertilizer Production

The Tennessee Valley Authority Act of 1933 authorizes the TVA Board of Directors (a) to improve and cheapen the production of fertilizer by manufacture and sale of fixed nitrogen, fertilizer and fertilizer ingredients at Muscle Shoals; (b) to make donations or sales of the product for experimentation, education and introduction of its use in cooperation with practical farmers; and (c) to establish, maintain and operate laboratories and experimental plants and otherwise to cooperate with farmers and farm organizations for experimental and demonstration uses of fertilizer.

The original Muscle Shoals plant included two synthetic nitrate plants which, under the National Defense Act of 1916, might also be used for making fertilizer during peacetime.

The early history of the facilities might have led to the assumption that the new agency's fertilizer activities would probably be concerned solely with nitrogen production. However, one of the first important operational decisions of the TVA Board of Directors was to undertake investigation and manufacture of phosphate fertilizer, which it considered would be the type best able to help the Tennessee Valley in particular and the South in general.

Five Major Products

TVA has engaged in the production of five kinds of fertilizer: concentrated superphosphate, calcium metaphosphate, fused tricalcium phosphate, ammonium nitrate and diamonium phosphate.

Concentrated superphosphate contains about 48 percent phosphate (P_2O_5) plant nutrient, or about 2½ times as much plant food value as is contained in ordinary superphosphate. Obviously there is advantage in reduced costs of essential plant food when this product is used. In 1930 five firms produced less than 98,000 tons. Production dropped in the next few years, and by 1934 seven plants were producing only 70,000 tons. TVA in its first year of production (1935) added 18,193 tons to the national supply and in 1949 reached a peak production of 158,716 tons. Since that time the TVA production rate has generally been downward, and in 1957 its production of superphosphate totalled 38,835 tons. Percentagewise, TVA supplied 40 percent of U.S. production in 1947 and only 3.5 percent in 1955.

Calcium metaphosphate, developed experimentally in the first years of TVA research, is a higher concentrate plant food than superphosphate. It contains 62 percent P_2O_5, or more than three times as much as ordinary superphosphate. TVA's first production amounted to 4,500 tons in 1938. The peak was reached in 1956 (73,258 tons) but dropped to 72,335 tons in 1957. TVA reports that the manufacturing process is now largely perfected. A commercial producer started building a plant in Idaho in 1957.

A third chemical that has been produced at the Muscle Shoals plant is *fused tricalcium phosphate.* Initial production in 1945 totalled 1,038 tons; the peak (32,525 tons) was reached in 1954, but production was discontinued.

Diammonium phosphate production was begun in 1955 with 2,980 tons. In 1957 production amounted to 14,165 tons. This fertilizer contains 21 percent nitrogen and 53 percent phosphate. It is the highest analysis solid fertilizer produced by TVA. Thus far its value in agriculture production has not been fully tested.

Dicalcium phosphate was produced by TVA between 1944 and 1951. The peak production was approximately 23,000 tons in 1950. It is reported, however, that this chemical was used primarily as a phosphorous supplement in animal feeds.

The TVA fertilizer currently in heaviest production is *ammonium nitrate.* TVA started producing this material in 1943 when it added something less than 13,000 tons to the national supply. In 1944 only two plants in the country were making ammonium nitrate fertilizer but consumption rose from 18,000 tons in 1943 to 147,000 tons in 1944 when TVA produced 81.3 percent of the national supply. For the year ending June 30, 1956, approximately 941,000 tons were used in the United States in addition to 314,000 tons of a mixture of ammonium nitrate and limestone. TVA production in 1956 was 137,711 tons, or 14.7 percent of the supply.

Relation to U. S. Production

The peak TVA production of ammonium nitrate was 197,207 tons in 1952. In 1957 the figure was 141,269 tons, slightly above the 1956 figure. Peak U.S. production was 400,306 tons in 1953, and the tonnage dropped to 266,604 in 1957.

In 1956 TVA's production of concentrated superphosphate amounted to about 1 percent of the phosphoric acid fertilizer produced in the United States, and TVA was the sole U.S. manufacturer of calcium metaphosphate. TVA produced about 2.7 percent of all phosphoric acid fertilizer used in the United States that year.

The present ammonium nitrate situation is somewhat different. While the ammonium nitrate produced by TVA supplied only about 2 percent of the nitrogen used as a plant nutrient in the United States and imports during the first eight months of 1956-57 exceeded in nitrogen content the total TVA production by 38 percent, TVA's ammonium nitrate output has been between 14 and 17 percent of the total U.S. production over the last 3 years.

While both the manufacture and the experimental and demonstration use of ammonium nitrate in the mid-forties would seem to be in accord with the legislative directive given TVA, there is a definite question of the need for continuing such a high rate of production. A report of the Department of Agriculture, issued in June 1957, stated: "The fertilizer industry, particularly in the case of nitrogenous materials, has more production capacity than it can use at present."

Demonstration Programs

TVA records indicate that for fiscal year 1957 a very small amount of the fertilizer was used in farm test demonstrations and other TVA use programs: specifically, about 2 percent of the concentrated superphosphate, about 8.8 percent of the calcium metaphosphate, and 0.16 percent of the ammonium nitrate fer-

tilizer. The balance of these products was used in the so-called distributor demonstration program. This program, currently conducted in 35 states, is directed at providing widespread introduction of new and improved TVA fertilizers to distributors and farmers, promoting adoption of improved fertilization practices, and aiding in reducing plant nutrient costs to farmers. Under this "uncontrolled" use program, fertilizer is placed on the market at a price about 10 percent below the same products offered by private enterprise manufacturers.

With TVA concentrated superphosphate amounting to only 1 percent or less of the total produced in the country, the pricing policy should not have too significant an impact nationally. On the other hand, at a time when there is a surplus of nitrogen production facilities in the country, it seems undesirably competitive for federally produced ammonium nitrate (constituting 15 to 17 percent of the total available supply and distributed in 35 states), to be priced 10 percent below the competing product.

Priced Below Cost

Apparently there is no specific relationship between cost of TVA products and their price. The price, as already stated, is geared to be about 10 percent below the competitive market. Cost figures, while probably accurate under the approved TVA accounting procedure, are of dubious value. TVA cites the costs for each product in its financial statements and annual reports, but the whole research program is charged off as a developmental expense and not reflected in the manufacturing costs of the fertilizer produced.

A comparable private enterprise manufacturer would probably need to include his research and development cost in the price of his product. At best he would need to finance research from revenues from the sale of the product, for he does not have a source of appropriations beyond this revenue. More importantly, TVA does not pay interest on its money, and does not pay any taxes on its fertilizer program.

TVA has consistently pointed out that under the law it might have allocated some costs of multiple purpose river-control projects to its fertilizer and chemical industry activities. It has not done so, but rather has charged these activities an appropriate rate for electric energy used. This electric energy, as shown elsewhere in this report, also is subsidized. As a result of these special conditions, the whole fertilizer program is heavily subsidized.

Table 10 shows chemical and fertilizer production statistics of TVA for 1957.

Conclusions

It would appear that some elements of the fertilizer development program have actually gone beyond research and demonstration. In some areas the activity has become competitive with the taxpaying, investor-financed fertilizer industry.

Although this report is concerned primarily with the electric utility activities of TVA, it is pertinent to point out that the fertilizer activities do not subsidize the electric power activities, but that subsidized power benefits the fertilizer program.

TABLE 10

TVA CHEMICAL & FERTILIZER PRODUCTION

(Year Ending June 30, 1957)

Product	*Quantity (tons)*	*TVA cost ($ per ton)*	*Sales price ($ per ton)*	*Commercial price of similar product ($ per ton)*
Phosphorus	1,791	297.40	300.00	.....
Concentrated Superphosphate (48% P_2O_5)	18,404*	112.01	98.97	98.00
	37*	112.01	100.68	
Calcium Metaphosphate (62% P_2O_5)	41,215*	121.16	99.31	.....
	3,633*	121.16	99.71	
Diammonium Phosphate	11,561	94.32	96.52	100.00
	2,604	94.32	98.61	
Nitric Acid	8,347	21.09	37.78	.....
Ammonium Nitrate	141,047	35.29	51.51	64.00
	222	35.29	36.42	

* P_2O_5.

TABLE 11

DETAILS OF TVA POWER EXPENSE

(Year Ending June 30, 1957)

System statistics	Kwh generated less station use (000's omitted)	Production expense including depreciation: Amount	Production expense including depreciation: Per kwh (mills)	Installed rated capacity at June 30, 1957 (kilowatts)	Ratio of average gross generation to installed rated capacity (percent)
Generation					
Multiple-use dams:					
Kentucky	1,156,163	$ 740,635	0.641	160,000	82.92
Pickwick	1,155,308	705,323	.611	216,000	61.59
Wilson	2,151,114	1,245,405	.579	436,000	57.07
Wheeler	1,153,549	776,021	.673	259,200	51.81
Guntersville	727,911	443,124	.609	97,200	85.88
Hales Bar	566,155	579,039	1.023	99,700	65.62
Chickamauga	781,518	480,151	.614	108,000	82.95
Watts Bar	940,879	563,035	.598	150,000	72.36
Fort Loudoun	603,489	587,852	.974	128,000	55.23
Norris	442,664	222,347	.502	100,800	51.57
Hiwasee	260,788	299,444	1.148	117,100	26.52
Cherokee	338,484	334,674	.989	120,000	33.28
Chatuge	24,476	53,955	2.204	10,000	28.26
Nottely	30,955	63,296	2.045	15,000	25.96
Fontana	969,404	460,327	.475	202,500	55.57
South Holston	161,215	149,952	.930	35,000	54.08
Watauga	107,558	225,398	2.096	50,000	26.63
Douglas	375,656	353,324	.941	112,000	38.92
Boone	209,712	307,673	1.467	75,000	32.77
Total direct	12,156,998	8,590,975	.707	2,491,500	56.56
Common	.....	2,695,315	.221	.....	
Total multiple-use dams	12,156,998	11,286,290	.928	2,491,500	56.56
Single-use dams:					
Apalachia	487,229	393,668	.808	75,000	74.63
Fort Patrick Henry	122,841	270,572	2.203	36,000	39.61
Great Falls	139,522	192,748	1.381	31,860	50.87
Ocoee No. 3	197,406	155,036	.785	27,000	83.63
Ocoee No. 2	138,159	219,287	1.587	21,000	75.24
Blue Ridge	41,754	109,418	2.621	20,000	25.71
Ocoee No. 1	74,105	146,597	1.978	18,000	48.44
Wilbur	22,924	63,444	2.768	10,700	24.77
Nolichucky	48,786	78,487	1.609	10,640	54.93
Columbia	522	7,526	14.418	800	7.55
Total single-use dams	1,273,248	1,636,783	1.286	251,000	58.66

Cumberland Basin projects:					
Wolf Creek	939,516	.....	.....	270,000	41.05
Center Hill	325,067	.....	.....	135,000	29.02
Old Hickory	55,068	.....	.....	25,000	109.48
Dale Hollow	116,473	.....	.....	54,000	26.74
Total Cumberland Basin projects	1,436,124	5,199,593	3.621	484,000	36.73
Aluminum Company dams:					
Calderwood	655,843	.....	.....	121,500	61.62
Cheoah	573,256	.....	.....	110,000	59.49
Santeetlah	192,061	.....	.....	45,000	48.72
Nantahala	251,127	.....	.....	43,200	66.36
Thorpe	61,464	.....	.....	21,600	32.48
Eight small dams	130,592	.....	.....	34,435	43.29
Total Aluminum Company dams	1,864,343	.....	.....	375,735	56.64
Total hydro generation	16,730,713	.....	.....	3,602,235	54.14
Steam plants:					
Kingston	11,768,464	32,189,652	2.735	1,440,000	98.50
Shawnee	11,219,068	28,886,311	2.575	1,350,000	103.22
Johnsonville	5,345,618	14,946,055	2.796	675,000	95.40
Gallatin	1,462,537	4,306,197	2.944	450,000	103.18
John Sevier	4,582,411	12,378,115	2.701	540,000	101.93
Colbert	5,349,005	14,357,363	2.684	720,000	89.28
Widows Creek	4,905,377	14,521,238	2.960	675,000	87.15
Watts Bar	3,585*	1,190,798	.....	240,000	.....
Acquired plants	65,529	1,174,139	17.918	197,250	4.44
Total steam plants	44,694,424	123,949,868	2.773	6,287,250	90.11
Total generation	61,425,137	.....	.....	9,889,485	76.58
Purchased power	6,898	22,980	.....		
Interchange power received	1,721,866	103,528	.....		
General production expense	.....	1,573,168	.....		
Total system input	63,153,901				
Delivered under Fontana agreement	1,747,929*	.....	.....		
Interchange power delivered	1,961,577*	921,205*	.....		
Net energy supply	59,444,395	$142,851,005	2.403		
Shop and internal uses	2,905*				
Transmission and transformation losses	2,402,884*				
Total sales of electric energy	57,038,606				

* Deduct.

Electric Power Development

On June 16, 1933 the Wilson Dam power plant became part of the TVA system. Through the years 18 other multiple purpose dam projects have been added to the power system. The last of the main Tennessee River projects came into operation in September 1944. Fontana Dam on the Little Tennessee River put its first hydro unit on the line in January 1945. These latter two structures essentially finished the necessary work for reservoir control of the river and its principal tributaries.

By 1945 hydroelectric power on the Tennessee River and its tributaries was for all practical purposes completely developed. A few units left at that time for future development have since been installed. By the end of June 1956 total installed capacity on the multiple purpose projects was 2,491,500 kilowatts (kw).

The installed capacity at single use dams had been brought to its present peak, 251,000 kw, during the fiscal year 1954. An additional 484,000 kw has been made available by adding the power from the Corps of Engineers' Cumberland River structures and the 375,735 kw of capacity of Aluminum Company dams to the TVA network. The total hydro capacity is now 3,602,235 kw.

No more installations are planned for the Tennessee River; additions proposed in the Cumberland River project and by the Aluminum Company are relatively small.

Table 11 lists details of the plants at which hydroelectric power is developed.

Steam Power Plants

The 1916 Act authorizing the construction at Muscle Shoals for war purposes provided for the construction of plants for the production of electric power by means other than water and so for the construction of steam or other thermal plants. Under this authority a plant was constructed at Muscle Shoals near Wilson Dam. The 1933 Act gives no specific authority for the acquisition or construction of steam plants, although provision is made in that Act for the allocation of costs of steam plants.[1]

In June 1940 an estimate of appropriation was submitted to Congress to provide for the construction of a steam electric plant near Watts Bar Dam. This structure was purported to be strictly for national defense, and on that basis the appropriation was made and the plant built.

[1] Section 15, which as amended expired in 1941, authorized use of bond issues for procurement of steam plants.

First Steam Plant Authorized

The First Deficiency Appropriation Act, May 24, 1949, provided funds for initiating the construction of a steam electric plant at Johnsonville, Tennessee. The project was approved on the grounds of "firming up" hydro power in order to meet the needs of the Atomic Energy Commission, to provide electric power for preferred customers, and to aid the government in disposing of its excess electric power to best advantage. Thus, the legislative history gives a confused picture of the basis of construction of the Johnsonville plant.

Requests for appropriations for additional steam plants have been sought primarily on the basis of AEC needs and the requirements of defense industries generally. However, an included justification has been the needs of consumers in the so-called TVA area. In March 1950 the Widows Creek steam plant was authorized primarily on the basis of AEC needs at Oak Ridge. The next year the Shawnee and Kingston plants had their authorization based on requirements of the AEC plants at Paducah and Oak Ridge. The Independent Offices Appropriation Act, 1952 (August 31, 1951), provided funds to start the Colbert plant, and the Supplemental Appropriation Act, 1953 (July 15, 1952) provided funds to start the Gallatin and John Sevier plants.

The Second Independent Offices Appropriation Act, 1954 (July 7, 1953), included funds to start construction on two new steam units as additions to existing steam plants, one at Kingston and one at John Sevier. The appropriations committee included none of the funds requested for a new steam plant proposed for construction at Fulton near Memphis. Funds for the Fulton plant were denied by the House and attempts in the Senate to reinstate the appropriation failed.

Meeting Needs of AEC

In considering the Supplemental Appropriation Act for 1953, members of Congress questioned the accuracy of TVA's allegations that AEC had either urged or compelled TVA to build additional plants. The House report on the Second Independent Offices Appropriation Act of 1954 included the following comment:

> "Evidence from the Federal Power Commission and the Defense Electric Power Administration indicates that in the twelve years from 1941 to 1952, inclusive, TVA has continuously overestimated its future power demand. The excess of estimate over actual consumption for 1951 was 323,000 kilowatts and for 1952 it was 779,000 kilowatts.

"After making an allowance of 10 percent for reserve and maintenance and giving no consideration to power available from other companies through interconnections, the margin of capability overload, based on the DEPA estimate, is estimated to be 897,000 kilowatts in 1955 and 974,000 kilowatts in 1956. With many new units coming into operation in the next few years, the Committee is assured that there will be a surplus rather than a shortage of power for years to come.

"The Committee is concerned, however, as to the requirements in future years for funds from the Federal Government and continued expansion of power facilities and every consideration should be given to ways in which the demands of the Federal Government can decrease and TVA become a self-sustaining agency."

Representative Jones of Alabama placed in the record a letter from Mr. Gordon Clapp, Chairman of the TVA Board, disputing the DEPA and FPC figures.

The Senate's report, in the Spring of 1953, on the same bill, said:

"The Committee is informed that 64% of the present power capacity of TVA is in hydroelectric and 36% is in steam, but that upon completion of the projects now under construction and authorized in this bill, 37% of such enlarged capacity will be in hydroelectric and 63% will be in steam. The Committee is also informed that while TVA is currently supplying 65% of the power requirements of the Atomic Energy Commission, by 1956 under steady operating conditions, TVA will be supplying about 52%, and 48% will be supplied by private companies.

"In agreeing with the House provisions for new steam facilities at John Sevier and Kingston, the Committee believes that careful review should be made of this changing power situation and, therefore, directs the staff of the Committee to gather essential facts which will enable the Committee to study the matter at the next session of the Congress."

Revenues vs. Appropriations

In 1954 the Appropriations Committee of the House of Representatives, in reporting the Independent Offices Appropriation Act, 1955 (June 24, 1954), recommended funds to continue construction in 1955 on 26 power units, including 22 units in 16 steam plants. However, it included no funds for new steam plant construction. On the floor, the House twice rejected amendments which would have included appropriations for new steam plants. The Senate Committee accepted the action of the House with respect to the steam plants. An amendment proposed in the Senate to provide funds for the Fulton steam plant was rejected.

Since 1954 there has been no additional authorization for the installation of steam power plants. Such construction as has been undertaken has been the extension of plants already built. The necessary funds have come from power revenues under TVA's interpretation of the limitation contained in the 1948 Government Corporations Appropriation Act.

Table 11 lists the names of the steam electric plants and their capacity. This table shows that the total installed generating capacity of the TVA system was 9,889,485 kw on June 30, 1957. Additional capacity totalling 1,856,000 kw was under construction.

Capacity Under Construction

The construction program of the Tennessee Valley Authority consisted of four elements: John Sevier No. 4, 180,000 kw; Johnsonville No. 7 to 10, 540,000 kw; Gallatin No. 3 and 4, 495,000 kw; and Widows Creek No. 7, 500,000 kw.

It is to be noted that the extensions of the John Sevier, Johnsonville, and Gallatin plants were included in the budget for fiscal year 1958. The President in his Budget Message January 16, 1957 said, "Legislation is recommended to authorize the TVA, subject to regular budgetary review, to finance new generating facilities by the sale of revenue bonds. After the Congress has acted on this legislative proposal, the power requirements of TVA will be re-examined."

While the installation of 500,000 kw at the Widows Creek plant was not included in the 1958 budget presentation, and apparently was not contemplated at the time of the President's statement, the project was initiated during 1957.

Question of Financing

The question of further expansion will await Congressional decision of ways and means to finance the proposed construction. As indicated in the foregoing, TVA has taken steps to increase its capacity by 500,000 kw above that contemplated in January 1957. Re-examination of the power requirements of the TVA should take due cognizance of the cut-back of AEC's power requirements. Reduction in the amount of 500,000 kw was made known at a hearing on atomic energy appropriations before the Subcommittee of the House Committee on Appropriations in July 1957. This cut-back plus the Widows Creek plant expansion indicate capacity of 1,000,000 kw in excess of that considered in the 1958 budget.

As an indication of the growth of the electric power system of TVA, Table 12 shows the installed capacity and capacity under construction at certain selected years.

The TVA electric power facilities are notable for

TABLE 12

TVA ELECTRIC POWER INSTALLATIONS*

Selected Years

(Capacity in Kilowatts)

	Installed	*Under construction*	*Total*
1933	184,000	.....	.....
1939	481,050	.....	.....
1942	1,374,552	.....	.....
1943	1,639,642	.....	.....
1944	1,893,842	.....	.....
1945	2,513,102	.....	.....
1947	2,538,902	402,600	2,941,502
1948	2,567,402	485,000	3,052,402
1951	3,181,110	3,632,070	6,813,180
1952	3,859,910	5,776,075	9,599,985
1953	5,102,985	4,836,000	9,938,985
1954	6,075,685	3,924,800	10,000,485
1955	7,809,985	2,240,500	10,050,485
1956	9,279,485	1,511,000	10,790,485
1957	9,889,485	1,856,000	11,745,485

* Includes Alcoa and Corps of Engineers projects from which energy is sold by TVA.

their relative high quality. The Task Force on Water Resources and Power stated in its 1955 report (p. 287): "The engineering work and construction standards appear to be in keeping with the best practices followed by the industry generally. The physical operations of the principal projects appear to compare favorably with those of private utilities. The task group was impressed with the competence of the field supervisory forces with which it came in contact."

While this comment was directed to all federal power projects, the consensus of competent observers was that TVA structures and personnel rate as high in the scale as any federal projects and staffs.

The Federal Power Commission compiled data on 463 steam electric plants operating in 1956 and found 47 with average annual heat rates less than 10,000 BTU per net kilowatt hour (kwh). Five of these plants, listed below in their relative order, are TVA facilities.

Efficiency of TVA Steam Plants

Order number	*Name*	*BTU per kwh*
8	Sevier	9,221
13	Colbert	9,413
24	Kingston	9,637
32	Shawnee	9,792
36	Widows Creek	9,846

The most efficient heat rate reported was 9,106 BTU at the Tanners Creek plant of the Indiana and Michigan Electric Company in Indiana. The first plant in the U. S. with a heat rate below 10,000 BTU was built in 1950. Other investor-owned utility plants include the Kygar Creek plant of Ohio Valley Electric Company which averaged 9,176 BTU per kwh, and the Phillip Sporn plant of Appalachian Electric Company and Ohio Power Company which averaged 9,337 BTU per kwh.

Power Sales and Costs

As shown in detail on Table 13, the total sales of electric energy by TVA for the year ending June 30, 1957 amounted to 57,038,606,000 kilowatt hours. The average production expense was 2.403 mills per kilowatt hour, and the average revenue was 4.12 mills per kilowatt hour. Total operating revenues for fiscal year 1957 amounted to $235,732,976, and reported net revenue totalled $58,143,669. Net power income to date as shown on Table 14 (Source and Disposition of Funds) has amounted to $413,430,359. Payments in lieu of taxes for the year 1957 amounted to $4,744,401, which is less than 1.85 percent of the total operating revenues.

TABLE 13

TVA STATEMENT OF NET INCOME FROM POWER PROGRAM

(Year Ending June 30, 1957)

	Kwh (000's omitted)	*Per kwh (mills)*	*Total*
REVENUES			
Sales of electric energy:			
Municipalities and cooperatives	16,778,159	4.31	$ 72,386,128
Federal agencies	31,666,929	4.05	128,300,599
Commercial and industrial	8,006,943	3.99	31,944,871
Electric utilities	36,742	4.61	169,312
TOTAL OUTSIDE SALES	56,488,773	4.12	232,800,910
Interdivisional sales, at rates generally comparable to rates to other customers	549,833	3.77	2,070,940
TOTAL SALES OF ELECTRIC ENERGY	57,038,606	4.12	234,871,850
Rents and other revenues:			
Outside sources	.....	....	842,007
Interdivisional rents	.....	....	19,119
TOTAL OPERATING REVENUES	.....	....	$235,732,976

EXPENSE	*Direct*	*Common*	*Total*
Production:			
Generation expense	$113,444,759	$1,445,441	$114,890,200
Purchased power	22,980	.....	22,980
Interchange power received	103,528	.....	103,528
Interchange power delivered	921,205*	.....	921,205*
TOTAL PRODUCTION EXPENSE	112,650,062	1,445,441	114,095,503
Transmission	8,177,797	.....	8,177,797
Customers' accounting and collecting	163,323	.....	163,323
Sales promotion	597,562	.....	597,562
Payments in lieu of taxes as required by Section 13 of the TVA Act	4,744,401	.....	4,744,401
Social security taxes	747,430	.....	747,430
Administrative and general expenses	7,384,161	102,288	7,486,449
Other expense	322,639	.....	322,639
Provision for depreciation	40,004,329	1,249,874	41,254,203
TOTAL OPERATING EXPENSE	$174,791,704	$2,797,603	$177,589,307
NET REVENUE (POWER INCOME)			$ 58,143,669

* Deduct.

TABLE 14

SOURCE AND DISPOSITION OF FUNDS

(Fiscal Year 1957 and Total to June 30, 1957)

	Fiscal year 1957	*Total to June 30, 1957*
Funds provided		
Federal Government:		
Congressional appropriations	$ 11,354,670	$1,356,547,891
Property transfers	17,688	19,382,954
Proceeds from bond sales	.....	65,072,500
	11,372,358	1,441,003,345
Income from operations:		
Net income from power program	58,143,669	413,430,359
Provisions for depreciation and amortization of acquisition adjustments	41,254,203	268,703,335
	99,397,872	682,133,694
Advance collections and contributions	(199,592)	574,770
TOTAL FUNDS PROVIDED	$110,570,638	$2,123,711,809
Disposition of funds		
Fixed Assets:		
Original cost of plant in service	$122,890,356	$1,711,354,561
Add:		
Original cost retired	3,126,514	86,795,740
Acquisition adjustments written off	.....	9,498,474
	126,016,870	1,807,648,775
Less:		
Net salvage from retirements	1,715,287	44,835,064
Depreciation at acquisition	54,663	26,680,524
	124,246,920	1,736,133,187
Construction in progress	(50,506,073)	56,661,276
	73,740,847	1,792,794,463
Repayments of federal government funds:		
Payments to U. S. Treasury general fund	30,000,000	175,059,019
Redemption of bonds	.....	65,072,500
	30,000,000	240,131,519
Inventories	11,038,543	35,613,445
TOTAL EXPENDED	114,779,390	2,068,539,427
Unexpended proceeds held for future use	(4,208,752)	55,172,382
TOTAL DISPOSITION OF FUNDS	$110,570,638	$2,123,711,809

SUBSIDIES

The Tennessee Valley Authority clearly is subsidized both in the field of taxes and in the field of interest charges. Except for these two major subsidies, which are sufficiently appreciable as to warrant separate and detailed consideration, the Tennessee Valley Authority is relatively free of many lesser subsidies.

Minor Subsidies Cited

Allocations of joint costs of multiple purpose projects to navigation and to flood control probably result in a subsidy to TVA electric power. The original charge-off of Wilson Dam costs have been considered excessive and to that extent they have been a subsidy to TVA.

TVA does not reimburse the Bureau of the Budget or the Treasury for services rendered by those two agencies, but the services of these two are essentially governmental and are not comparable to services rendered by some non-governmental entity to private enterprise.

The General Accounting Office performs an auditing service for the Tennessee Valley Authority but the costs are met by TVA.

The Tennessee Valley Authority has its own retirement system financed by the Authority and by the employees. In addition, TVA is subject to the Social Security law the same as any non-governmental activity and it shares with its employees the cost of this service. TVA reimburses the Post Office for carrying its mail, and even if the government rate is slightly less than that generally charged, the total dollar amount involved is a relatively small portion of the TVA operation.

TVA does not carry insurance and this practice is in accord with that followed by the federal government. Claims for losses ordinarily covered by insurance are borne by TVA from its own funds and not from separate appropriations.

Insurance to provide compensation for disability or death resulting from injury to employees is not carried by TVA and this cost is met by a special government-wide appropriation for the purpose.

In summary, the secondary or minor subsidies that are granted to the other federal power agencies are for all practical purposes non-existent in the Tennessee Valley Authority.

Allocation of Costs

TVA has been a pioneer in devising a procedure for the computation of the allocation of costs among reimbursable and nonreimbursable water resource development activities of a river. The multiple purpose projects of TVA have had the costs allocated to navigation, to flood control and to electric power development. Although the Act authorizes allocation of costs to the production of fertilizer and to national defense, no direct allocations of the river structures have been made to these purposes. Rather, activities for either of these purposes have been charged for power an amount which the agency considers adequate for the purpose.

Section 14 of the Tennessee Valley Authority Act provides, among other things, that the Board shall determine how much of the value or the cost of certain property shall be allocated and charged to flood control, navigation, fertilizer, national defense and the development of power. The law says "The findings thus made by the Board, when approved by the President of the United States, shall be final." The first report on the allocations was made to Congress and printed in House Document 709, 75th Congress, 3rd Session, in June 1938. From time to time since that report, additional allocations have been made as new multiple purpose projects have come into being.

Table 15 shows figures for allocation of joint costs for selected years.

Initially, there was some criticism of the provision that costs of the structures be charged off to the nonreimbursable governmental activities. Investor-financed power systems received no federal support when flood control, navigation improvement or other general benefits occurred as a result of a privately owned dam and reservoir. The logical assumption was

TABLE 15

ALLOCATIONS OF COST
JOINT INVESTMENT IN MULTIPLE PURPOSE PROJECTS

(Selected Years)

	Flood control		*Navigation*		*Power*	
	Allocation	*Percent*	*Allocation*	*Percent*	*Allocation*	*Percent*
1938	$ 15,870,627	25	$ 22,218,877	35	$ 25,393,002	40
1945	103,689,945	30	103,689,945	30	138,253,260	40
1953	127,038,217	31	110,646,189	27	172,116,294	42

that, since the federal government was going into the power business, it should not charge off navigation and flood control any more than investor-financed utilities could charge off parts of their projects because of the nonpower benefits created.

Over the last quarter of a century, however, the federal government has gone further into the business of building multiple purpose projects involving electric energy production. In recent years a partnership program has evolved wherein costs for different purposes in a multiple purpose development may be borne by different entities. Thus, the federal government now generally accepts the responsibility for providing flood control and improvements for navigation, whereas some other entity may accept the responsibility for producing hydroelectric power; and benefits such as irrigation may be assessed against some local governmental unit, even though the initial costs are borne by the federal government.

Allocation Formula Questioned

Over the years, considerable study of the allocation problem has been made, but the various procedures proposed need not be examined here. Suffice to say that the federal agencies have agreed among themselves on a procedure known as the "separable costs-remaining benefits" method, which is essentially the same as the "alternative justifiable expenditure" basis, devised by the Tennessee Valley Authority. Probably a more precise record of allocation would be the so-called "use of facilities" method. Whether the adoption of this refinement would warrant the additional costs and effort is questionable.

A principal weakness of the presently accepted method is that a part of the allocation is dependent upon an estimate of benefits. There is a tendency, as shown by examination of the TVA project earlier in this analysis, to assume benefits for nonreimbursable activities somewhat greater than actually result.

In 1949 the Federal Power Commission, at the request of the Senate Committee on Public Works, undertook a review of the allocation of costs of the Tennessee Valley Authority. The majority finding accepted the TVA allocation. A dissenting member questioned benefits ascribed to improvements to navigation as being somewhat optimistic.

The General Accounting Office in one of its audits of TVA said: "On the basis of our review of the Authority's evaluation of the navigation and flood control tangible benefits, the portion of the cost of multiple use facilities allocated by the board to the two purposes is not justified."

Any understatement of investment in power facilities is reflected in measurements of the financial success of TVA power operations, through understated amortization or depreciation of the power investment, aside from any understatement of interest or taxes applicable to the operations.

Navigation, Flood Control Charges High

As more and more money is invested in steam power development, which is becoming a more significant part of the TVA operation, the allocation of joint costs of multiple purpose projects becomes less significant. If all joint costs were charged to power, the power investment would be increased by $238,000,000, or 14 percent. Nevertheless, as set forth in previous paragraphs of this report, it appears that the allocations of cost to improvement in navigation and to flood control have been greater than actually warranted in the circumstances.

Thus, though the general method of allocation of costs appears to be satisfactory under presently accepted procedures, its application to the TVA has

TABLE 16

ALLOCATION OF COSTS, TOTAL SYSTEM INVESTMENT

(Selected Years)

	Flood control		Navigation		Power		Chemical		General	
	Millions of dollars	Percent	Millions of dollars	Percent	Millions of dollars	Percent	Millions of dollars	Percent	Millions of dollars	Percent
1938	$ 19	17.6	$ 26	24.1	$ 49	45.4	$ 5	4.6	$ 9	8.3
1945	146	21.2	138	20.0	391	56.8	6	.9	8	1.1
1950	165	17.9	154	16.8	555	60.3	31	3.4	15	1.6
1952	178	16.3	155	14.2	702	64.5	35	3.2	20	1.8
1953	182	13.8	157	11.9	925	70.0	35	2.7	21	1.6
1954	184	12.2	158	10.5	1,109	73.5	37	2.5	19	1.3
1956	184	9.7	158	8.0	1,588	80.5	36	1.3	18	.5
1957	184	8.7	159	7.5	1,711	81.0	37	1.8	17	.8

doubtless resulted in optimistic allocations to nonreimbursable features, with a consequent overstatement of the degree to which the power activities are self-liquidating and self-supporting.

Over-all allocations for selected years are shown in Table 16. The figures show clearly that the joint facilities allocation has become increasingly less significant in recent years.

Taxes

In 1955 the operating revenues of investor-financed electric companies in the United States aggregated $8,360,074,000, and net income amounted to $1,244,063,000. Federal taxes totalled $1,064,425,000 and other taxes totalled $732,078,000. Taxes thus amounted to approximately 21.5 percent of total operating income of the companies.

Obviously, taxes are a cost, the elimination of which would constitute a subsidy.

The Econometric Institute in "The General Outlook for the American Economy, 1954-1974," published in 1954, stated:

> "Regardless of how the economist theorizes about taxes, the fact is that the businessman must and does treat taxes as a cost. The tax on payrolls is simply an additional wage cost, a tax on real estate is simply a capital charge like interest. If the businessman fails to earn these taxes, he loses his business. Moreover, he must treat a profits tax as a percentage of selling price which he then must move up to accommodate the tax. Anyone planning additional capacities must consider a profits tax as a cost if he is to interest capital."

In July 1955, representatives of the TVA presented the Senate Committee on Public Works with a statement criticizing the Hoover Commission analysis of the TVA tax situation as to state and local taxes. The TVA statement said that the actual payments not only fulfill the requirements of law, but have been found to be satisfactory to the states and local governments.

Under our system of a federal government and 48 sovereign states, the theory of independence is maintained in part through a prohibition of one government's taxing the other without its consent. Since the cloak of government immunity has been assumed by the federal government for the business activities of TVA, the states are prohibited from levying taxes against those enterprises without the consent of the federal government. Had the legislative proponents of TVA been sincerely interested in establishing a "yardstick," about which so much has been spoken, they could have provided that the states levy taxes against TVA enterprises to the same degree that these states and local governments would have levied taxes against similar enterprises financed by nongovernmental investors. This was not overlooked.

On April 13, 1939, Senator Norris said: "On my desk now there is a printed amendment intended to be offered which provides that all property of the TVA shall be subject to taxation everywhere under the local laws of taxation. If we go to that extreme, Senators can see that the TVA would be out of business in three months."

States Lose Taxes

To state that actual payments in lieu of taxes fulfills the requirements of law rather begs the question of their adequacy. As to the assumption that these payments have been found to be satisfactory to the states:

are the states truly concerned with these payments when TVA operates so many functions which in other jurisdictions are carried on by the states themselves, and when the TVA provides all the citizens of the area with tax-free electric power?

The Governor of Tennessee wrote in 1953 to a member of the U. S. House of Representatives that "people in the Tennessee Valley live in dread" over the possibility that the Congress will not approve a further expansion of the Tennessee Valley Authority. Are not the state governments sufficiently traduced by the federal expenditures under TVA within their jurisdictions to lead them to refrain from any complaint concerning the payments made by TVA to those states in lieu of taxes?

Tax Is Business Cost

The TVA complaint against the computations of the Hoover Commission also pointed out that in accordance with the law and federal policy, TVA pays no federal income taxes. It is correct that TVA pays no income taxes, but this fact does not eliminate the cost. A cost is a cost, and the fact that it is shifted from one place to another does not eliminate it as a cost. Except to the extent that a man's own energies and talents can be wasted without detriment to others, the activities of mankind can be divided into two categories: those producing wealth and those consuming wealth. All wealth consumption must be supported by the activities producing wealth.

Government, in its traditional American form, does not produce wealth. Its activities must be a burden upon the wealth-producing enterprises of the nation. When the government chooses to take within its jurisdiction a wealth-producing activity and treat it as a governmental activity, it can, merely by the enactment of law since it is a sovereign state, relieve that wealth-producing activity of its burden for the support of government. This need not be so, but it may be so. In the instance of TVA, the government has chosen to require only that TVA power activities be "self-supporting and self-liquidating." There is no requirement that it make a contribution to the support of government.

But, since the business of production of electricity is taken over by the federal government, who bears the cost of government that would have been borne by this electric power-producing enterprise if it had not been relieved of its tax burden? Who makes the contribution to government that might have been made by the Commonwealth and Southern Company's properties had they continued in private ownership over the past 20 years? Obviously, other revenues must compensate for the amounts not levied against this segment of production.

In 1922, in ruling on a utility case, the Supreme Court of the United States said that tax exemption is, in effect, part of the return on the investment. Thus, the courts have ruled that tax exemption has a definite monetary value and it is in fact no different from a subsidy. Thus it is with TVA.

It is clear that to the extent TVA does not pay federal, state, and local taxes, its power operations and other commercial operations are subsidized, and the burden that would normally be met by the taxes on this portion of the enterprise is met by the other taxpayers of the nation.

Unpaid Tax Is Subsidy

The real impact of taxes on electric power falls on the ultimate power user. Taxes paid by a utility company are passed on to the consumer. Those not paid by TVA amount to a subsidy from the general taxpayer to the TVA power users. In the case of power sold by TVA to AEC (or other federal activities), the subsidy from the taxpayer is passed back to him through savings to AEC. So long as AEC uses a large proportion of TVA power, part of the tax subsidy to TVA is essentially a transfer. But this situation can hardly justify tax exemption.

Interest

The Tennessee Valley Authority Act provides in Section 14, as amended in 1935, that as a matter of policy surplus power is to be sold at rates which, in the opinion of the Board, will produce gross revenues in excess of the production cost of the power in order that, as soon as practicable, power projects will be self-supporting and self-liquidating.

Detailed procedures and standards were not set forth in the Act as a guide for TVA. While assets are currently computed to be in excess of two billion dollars, interest payments have been involved only on the funds provided by bonds which totalled $65,072,500. These bonds were used principally for the purchase in 1939 of electric utility properties in the TVA area from Commonwealth and Southern Company. By the end of fiscal year 1956, the total amount of the bonded indebtedness had been retired.

The bonds were sold to and held by the United States Treasury. The interest charged on the outstanding bonds amounted to 2 percent for the period August 16, 1949 through August 15, 1950; 1⅞ per-

cent effective August 15, 1950 through fiscal year 1952; 2 percent through August 15, 1953; and 1 percent in earlier years.

In July 1955, in testimony before the Senate Public Works Committee, TVA representatives complained against computations of the Hoover Commission Task Force on Water Resources and Power which had used a 3 percent interest rate. TVA contended that during the period in question the government's actual cost of money averaged about 2 percent.

Interest Rates Vary

Records show that the computed annual interest rate on marketable Treasury issues, a figure not available for the early TVA years, was 2.52 percent in 1939. The average figure fell to a low of 1.718 percent in 1945, rose to 2.001 in 1949, hovered around 2 percent for the next three years, reached 2.207 in 1953, dropped back slightly in excess of 2 percent for two years, and then for 1956 went to 2.427 percent and for 1957 to 2.707 percent.

Examination of the record shows that these percentage figures are averages and do not truly reflect the cost to the federal government of long-term money. Government borrowings are for both short and long terms and are for all purposes—from meeting current expenses to the investment in capital improvements for public works. Actually, for a number of years financing was by means of relatively short-term bonds even though the purposes for which the funds were used were projects which customarily would have been financed through the means of long-term loans.

More recent loans have been issued with a nominal rate of 3½ percent. Late in October 1957, 91-day notes were paying 3.55 percent, and 2½ percent bonds were selling at a price that if held to maturity would yield over 4 percent.

Thus, while it is not possible to determine precisely what the cost to government has been of borrowings for investment in TVA structures, it is not unreasonable to assume that these long-term projects would be financed by the proceeds of long-term loans which have cost more nearly 3 percent than 2 percent. Hence, in this study, for the purpose of determining an assumed cost of money for investment in TVA, the 3 percent figure is used.

TVA Customer Not Charged

TVA does not, in fact, pay any amount specifically as interest on the investment that is included in the overall indebtedness of the United States. Nevertheless, the Treasury, or the general taxpayer, must pay interest on this indebtedness and it is, of course, an out-of-pocket cost of the government.

Payments by TVA to the Treasury, over the ten-year period 1948-57 under Title II of the Government Corporations Appropriations Act of 1948, made from net power proceeds and credited to the liquidation of investment allocated to TVA power facilities, have actually averaged only 3.29 percent of the outstanding investment allocated to power. In this connection, there is evidence that the early administrators of TVA alleged that earnings from power would be more than adequate to return to the Treasury the entire cost of the project.

While the use of 3 percent interest is satisfactory for determining the cost of the project to the taxpayer, it is not the proper figure to use in determining the loss to the taxpayer. The general taxpayer can be considered an investor who has placed some of his earnings in the TVA system. The investor is entitled to a return on his investment comparable to the return permitted by a regulatory agency if the TVA system had been operated as a private utility. Under such an assumption, the power facilities would probably have been financed through bonds at 3¼ to 3½ percent, preferred stock at 4½ percent, and common stock between 9 and 10 percent.

A typical capitalization would place 40 to 50 percent of the funding in bonds, 20 percent in preferred stock and the remainder in common stock. These percentages and interest rates would call for an overall return between 5.5 and 6.25 percent on the investment. For the purpose of comparison, this analysis has used the more conservative figure, 5.5 percent.

Deficiency in Returns

It is clear from the foregoing that, since TVA pays no interest on power investment, pays no federal taxes, and pays only limited amounts in lieu of state and local taxes, its revenues are considerably less than would be required if these costs were borne by the power consumer rather than by others. The fact that these costs have been shifted from the TVA power rate does not mean that they do not exist.

Thus, in order to obtain a fair analysis of the cost of TVA power operation, it is necessary to make an approximation of these costs that have been shifted from TVA and borne by others.

In making such an estimate, it must be recognized that any assumption will be open to attack because the

estimate must to some extent be based upon assumptions contrary to actual conditions.

If the power development in the TVA service area had been made by investor-financed utilities, it is quite likely that the whole pattern of development would have been different. If the price of energy sold by TVA had included all costs, there is a likelihood that the volume sold would not have been as great, and that as a consequence there would not have been the demand for expansion that has existed. Without the demand, naturally, there would not have been the expansion.

Furthermore, if the development had been made by an investor-financed utility, some advantage would probably have been taken of the rapid tax amortization available between 1939 and 1957 to stimulate construction of defense facilities with private capital.

Power Subsidy Measured

However, the existence of these irresoluble unknowns does not preclude a reasonable estimate of the true cost of TVA power and the extent to which this power has been subsidized by the general taxpayer. The next step is to determine the most equitable and least inaccurate premise upon which to base computations.

For purposes of estimation, the actual taxes paid by the investor-financed utilities might be related to value of plant, to income, to kilowatt-hour production of energy, or to kilowatt capacity of installation.

It appears that relating taxes to income, even though the federal tax is based on income, is not valid since income taxes could be made small by having a small revenue.

Any relationship to the value of plant can involve a distortion, particularly in considering TVA, since a large part of the original plant consisted of hydroelectric facilities. An equal capacity of thermal electric facilities might have been adequate to meet the requirements met by the hydro facilities, and the thermal facilities probably could have been produced for a lesser investment. Therefore, consideration of investment in hydro facilities as a base for tax comparison obviously involves the possibility of a distortion unfavorable to the TVA system.

For tax estimation purposes, energy production in kilowatt hours could be used as a base. The Task Force on Water Resources and Power of the Second Hoover Commission, in relating taxes to energy production, reported that in 1953 the federal taxes of investor-owned electric utilities were equivalent to approximately 1 mill per kilowatt hour.

However, for the purpose of this analysis, it has been decided that installed generating capacity furnishes a good base for comparison because this base eliminates any investment disparity and minimizes any production variation.

TVA generates and transmits energy at wholesale; it does not distribute it. Most of the investor-financed systems not only generate and transmit but also distribute energy. In this analysis, the distribution phase of TVA power is eliminated in order to make the comparison to TVA production as equitable as possible.

Comparison Based on Capacity

The method selected is probably the fairest both to TVA and to the taxpayer in estimating what the hidden costs have been—that is, the costs that have existed but have not been paid by TVA. That these costs have not been paid by TVA is not a criticism of the agency, but is rather a recognition of the legal requirements and privileges under which TVA operates.

The financial aspects of past TVA power operations have been analyzed to determine what the results would have been under certain assumed standards. The standards are described and the results are compared (Tables 17 and 18) with the results of TVA power operations. The capital costs of power generating facilities and of transmission and marketing facilities were based on the cost of such facilities as reported by TVA. These were adjusted to include 3 percent interest during construction.

Table 17 shows estimates of annual financial requirements which would provide for repayment of the power investment and the annual cost of service which correspond to costs in the ordinary business sense, using 3 percent as the cost of money. These two computations give results in cumulative totals that differ from one another by less than 1 percent, with the financial requirements being the smaller. The principal differences between the two are that:

(1) The financial requirements include the annual costs of amortizing the power investment with interest on the unamortized investment and with allowances for interim replacements; and

(2) The cost of service computation includes annual amounts for depreciation on the straight-line basis plus interest on the unamortized power investment. Both computations include operation and maintenance expenses and taxes.

Cost of operating expenses, including administrative and general expenses, were as reported by TVA. Al-

lowances for replacement of short-lived facilities were those reported, but not less than the percentages used by the Federal Power Commission.

Interest and Taxes Computed

Estimates of interest and amortization on the capital costs for power were computed using compound interest (equal annual payments) at 3 percent and repayment periods as follows:

Hydroelectric projects	50 years
Steam electric plant	35 years
Transmission facilities	35 years

The annual allowance in lieu of taxes was computed as the amount of federal, state, and local taxes paid by investor-financed utilities in the regions peripheral to the TVA service area on production and transmission facilities providing equivalent amounts of power capacity. It was assumed for this purpose that, in the absence of TVA, the same amounts of capacity would have been provided by the utility companies in standard generating plants. Data for these tax computations were obtained from the Federal Power Commission.

The annual costs of service were computed using the same annual operating expense figures and the same tax figures as used in estimating financial requirements.

This computation is identical with that reported by the Second Hoover Commission. Additional computations were made for the years 1954 to 1957 inclusive. Table 18, column 8, sets forth the computed cost of service identical (with one exception) with the foregoing, in which it was assumed that the development in the TVA area would have been similar to that in the surrounding area. The exception is the assumption that the development would have been of the same character as actually built by TVA. This latter computation imputes TVA paying taxes of the same relative magnitude as those actually paid by the neighboring companies. The computed deficiency of $201 million ($469-$268) is approximately 75 percent greater than the previous computation.

As explained in the discussion on interest rates, an investor-financed development probably would have required the payment of about 5.5 percent rather than 3 percent. Table 18 shows the computed cost of service on the basis of depreciation as prescribed by the Federal Power Commission; the cost of money at 5.5 percent; and for taxes computed, first, on the assumption that the development in the TVA area would have been similar to the development made by peripheral companies (column 7) and, second, on the assumption that the same character of plant built by TVA would have been built by the peripheral companies earning 5.5 percent (column 9).

In summary, the following are the results:

Net income as reported by TVA	$413,430,359
Net income (deficiency) as adjusted for taxes on basis of development similar to peripheral companies:	
At 3 percent interest on average investment	($267,880,435)
At 5.5 percent return on average investment	($540,256,214)
Net income (deficiency) as adjusted for taxes on basis that same character of plant had been constructed by peripheral companies as TVA itself built:	
At 3 percent interest on average investment	($468,952,145)
At 5.5 percent return on average investment	($741,327,924)

While TVA has reported a net income over the 24-year period of over $413,000,000, actually, so far as the taxpayer is concerned, the operation has resulted in a loss amounting to at least $268,000,000. If the development had been made by investor-financed utilities, such that the same capacity was provided, a return on the operations in taxes and interest rate would have been approximately $540,000,000 more than was actually received.

Nation Bears Cost

This gives a measure of the TVA operation cost borne by the remainder of the country. If TVA as a government corporation had been required to pay taxes and the true cost of money as an enterprise fairly in competition with non-federal utility operations, the additional return to the taxpayer would have been approximately $740,000,000 greater.

Obviously, the development of the TVA electric system under existing laws has permitted the sale of electricity over the past quarter century at prices between one-half and three-quarters of a billion dollars below cost.

This favored treatment of the TVA service area has not only resulted in an unfair shift of wealth within the nation, but also has required the taxpayer living outside of the benefited area to suffer an out-of-pocket cost between $268 million and $470 million, equal respectively to 0.8 and 1.3 mills per kwh on total TVA sales.

TABLE 17

RESULTS OF THE OPERATIONS OF THI
ON THE BASIS OF ITS REPORTED FIGURES AND ON THI

RESULTS OF OPERATIONS BASED ON TVA REPORTED FIGURES

Fiscal year	*Capacity available, (kw)*	*Total sales (million kw)*	*Total operating revenues*	*Average revenue per kwh (mills)*	*Payments in lieu of state and local taxes*	*Total power expenses including taxes paid*[1]
1933–38	349,600	2,379.5	$ 6,732,447	2.83	$ 268,464	$ 7,316,167
1939	421,600	1,618.3	5,507,077	3.40	243,056	4,028,722
1940	915,637	3,629.7	15,285,074	4.21	527,593	10,985,844
1941	1,009,055	4,974.1	21,137,371	4.25	1,499,394	14,146,593
1942	1,353,727	5,983.4	25,329,954	4.23	1,859,438	21,656,602
1943	1,618,592	8,336.1	31,674,210	3.80	1,960,472	18,525,356
1944	1,872,792	9,110.4	35,429,546	3.90	2,168,798	21,313,855
1945	2,201,982	10,314.7	39,383,231	3.82	2,137,484	21,401,197
1946	2,227,782	9,058.8	35,264,545	3.89	1,992,256	19,050,821
1947	2,227,782	11,587.4	44,144,090	3.81	1,668,416	22,895,713
1948	2,256,282	12,244.9	48,769,524	3.98	2,005,482	32,151,713
1949	2,434,532	13,614.2	58,030,515	4.26	2,050,437	37,086,100
1950	2,648,050	14,165.6	57,786,111	4.08	2,470,692	31,717,899
1951	2,835,550	16,522.0	70,329,580	4.26	2,444,796	44,476,468
1952	3,859,910	20,177.2	95,004,390	4.71	3,036,207	69,908,041
1953	4,751,050	23,678.7	104,877,869	4.43	3,418,110	86,251,155
1954	5,710,750	30,058.8	133,947,808	4.46	3,578,668	105,806,851
1955	7,434,250	42,045.0	188,162,989	4.47	3,878,466	140,649,711
1956	8,903,750	53,845.4	221,642,216	4.12	4,147,654	167,783,049
1957	9,513,750	57,038.6	235,732,976	4.13	4,744,401	177,589,307
Cumulative total.....		350,382.8	$1,474,171,523	4.21	$46,100,284	$1,054,741,164
Electric plant acquisition adjustments.....						
Net power income.....						

[1] Does not include interest expense except on a small amount of bonded indebtedness. TVA reports a net return of 4 percent on the depreciated power investment for the entire period.

TENNESSEE VALLEY AUTHORITY SYSTEM
BASIS OF INTEREST AT 3 PERCENT AND COMPUTED TAXES

ANALYSES OF OPERATIONS

Excess or (deficiency) revenues over expenses	*Computed total tax* [2]	*Financial requirements including taxes as computed* [3]	*Cost of service including taxes as computed* [3]	*Revenue over computed financial requirements*	*Revenue over computed cost of service*
$ (583,720)	$ 2,140,000	$ 13,962,019	$ 15,298,873	$ (7,229,572)	$ (8,566,426)
1,478,355	884,672	6,776,159	6,878,412	(1,269,082)	(1,371,335)
4,299,230	1,584,627	14,831,253	14,827,019	453,821	458,055
6,990,778	3,955,242	20,872,437	22,314,331	264,934	(1,176,960)
3,673,352	6,403,139	31,793,328	31,917,548	(6,463,374)	(6,587,594)
13,148,854	9,169,608	34,042,419	34,000,279	(2,368,209)	(2,326,069)
14,115,691	10,875,662	39,926,127	40,200,200	(4,496,581)	(4,770,654)
17,982,034	13,120,772	43,303,950	43,967,246	(3,920,719)	(4,584,015)
16,213,724	13,621,524	42,210,429	43,410,996	(6,945,884)	(8,146,451)
21,248,377	13,099,359	46,241,319	47,282,505	(2,097,229)	(3,138,415)
16,617,811	13,923,019	56,204,225	57,192,158	(7,434,701)	(8,422,634)
20,944,415	15,919,464	63,815,174	64,542,958	(5,784,659)	(6,512,443)
26,068,212	18,288,624	60,753,599	61,474,750	(2,967,488)	(3,688,639)
25,853,112	20,235,761	76,695,304	77,416,907	(6,365,724)	(7,087,327)
25,096,349	24,818,176	107,974,932	107,950,440	(12,970,542)	(12,946,050)
18,626,714	31,432,219	134,857,027	133,817,919	(29,979,158)	(28,940,050)
28,140,957	37,625,683	166,131,628	166,061,156	(32,183,820)	(32,113,348)
47,513,278	50,023,875	218,149,896	218,783,680	(29,986,907)	(30,620,691)
53,859,167	61,969,400	261,865,739	265,779,514	(40,223,523)	(44,137,298)
58,143,669	70,160,117	286,020,167	288,935,067	(50,223,523)	(53,202,091)
$419,430,359	$419,280,943	$1,726,427,131	$1,742,051,958	$(252,191,940)	$(267,880,435)
6,000,000 [4]					
$413,430,359					

[2] Based on the federal, state, and local taxes applicable to production and transmission facilities, as related to plant capacity in kilowatts, which were paid by privately owned utilities in the region during the years of analyses.

[3] Includes interest expense at 3 percent.

[4] Acquisition adjustments written off against accumulated net income—$2 million in 1943, $3 million in 1944, and $1 million in 1945.

TABLE 18

TVA's REPORTED NET POWER INCOME AFTER ADJUSTMENTS

Fiscal years	*Reported net power income*	*Net income adjusted for added depr.*	*Net income adjusted for 3% interest*	*Net income adjusted for 5.5% cost of money*
1933–38	$ (583,720)	$ (752,852)	$ (6,694,890)	$(11,509,050)
1939	1,478,355	1,411,140	(729,719)	(2,537,446)
1940	4,299,230	4,175,844	1,515,089	(1,001,028)
1941	6,990,778	6,833,464	1,278,888	(3,669,749)
1942	3,673,352	3,505,496	(2,043,893)	(7,251,656)
1943	13,148,854	12,941,403	4,883,067	(2,458,575)
1944	14,115,691	13,866,938	3,936,210	(4,987,965)
1945	17,982,034	17,685,054	6,399,273	(3,707,595)
1946	16,213,724	15,889,214	3,482,817	(7,587,920)
1947	21,248,377	20,921,818	8,292,528	(3,079,844)
1948	16,617,811	16,282,206	3,494,903	(8,085,606)
1949	20,944,415	20,597,053	7,356,584	(4,678,386)
1950	26,068,212	25,686,932	12,129,293	(597,812)
1951	25,853,112	25,448,752	10,703,638	(3,039,421)
1952	25,096,349	24,642,171	8,865,919	(5,734,823)
1953	18,626,714	18,048,295	(925,941)	(18,195,290)
1954	28,140,957	27,407,723	1,933,667	(20,795,478)
1955	47,513,278	46,585,709	15,524,718	(11,727,414)
1956	53,859,167	52,703,544	13,684,448	(20,026,851)
1957	58,143,669	56,900,272	12,213,625	(26,403,646)
TOTALS	$419,430,359	$410,780,176	$105,300,224	$(167,075,555)

NOTE. All net income totals shown above should be reduced by $6,000,000 to cover electric plant acquisition adjustments written off.
( ) Indicates deficit.

FOR DEPRECIATION, INTEREST AND COMPUTED TAXES

Net income adjusted for added taxes			
TVA development similar to peripheral utilities		*Development identical to TVA*	
3%	*5.5%*	*3%*	*5.5%*
$ (8,566,426)	$ (13,380,586)	$ (11,404,346)	$ (16,218,506)
(1,371,335)	(3,179,062)	(2,711,449)	(4,519,176)
458,055	(2,058,062)	(2,258,236)	(4,774,353)
(1,176,960)	(6,125,597)	(4,077,556)	(9,026,193)
(6,587,594)	(11,795,357)	(10,205,687)	(15,413,450)
(2,326,069)	(9,667,711)	(7,563,985)	(14,905,627)
(4,770,654)	(13,694,829)	(10,915,671)	(19,839,846)
(4,584,015)	(14,690,883)	(10,512,306)	(20,619,174)
(8,146,451)	(19,217,188)	(14,229,433)	(25,300,170)
(3,138,415)	(14,510,787)	(9,864,576)	(21,236,948)
(8,422,634)	(20,003,143)	(15,195,382)	(26,775,891)
(6,512,443)	(18,547,413)	(12,479,326)	(24,514,296)
(3,688,639)	(16,415,744)	(9,769,767)	(22,496,872)
(7,087,327)	(20,830,386)	(16,396,435)	(30,139,494)
(12,946,050)	(27,546,792)	(25,438,472)	(40,039,214)
(28,940,050)	(46,209,399)	(45,575,831)	(62,845,180)
(32,113,348)	(54,842,493)	(54,788,178)	(77,517,323)
(30,620,691)	(57,872,823)	(54,900,056)	(82,152,188)
(44,137,298)	(77,848,597)	(70,256,111)	(103,967,410)
(53,202,091)	(91,819,362)	(80,409,342)	(119,026,613)
$(267,880,435)	$(540,256,214)	$(468,952,145)	$(741,327,924)

ECONOMIC INFLUENCES

The Utility Responsibility

THE ORIGINAL RESPONSIBILITY of the Tennessee Valley Authority for disposition of electric energy was limited to the disposal of surplus power developed at the government properties at Muscle Shoals. The original bill contemplated, also, that TVA would dispose of electric energy developed at the Cove Creek project (Norris Dam) and subsequently at such other developments as might become authorized by Congress. Nowhere, however, does the authorizing legislation provide that the Tennessee Valley Authority should undertake any utility responsibility.

The capacity at the original installation taken over in 1933 was 184,000 kilowatts. A small fuel plant with a capacity of 5,300 kilowatts increased the generating system the next year. Neither 1935 nor 1936 saw any changes. However, in 1937 TVA installed capacity jumped to 354,900 kilowatts and TVA began its assumption of utility responsibility.

In 1937 TVA acquired properties of the Mississippi Power Company and the Alabama Power Company, and in the next two years additional properties of: Tennessee Public Service Company, Kentucky-Tennessee Light and Power Company, West Tennessee Power Light Company, Memphis Power Light Company, Tennessee Electric Power Company, and more properties of the Mississippi and the Alabama Power Companies.

TVA Monopoly Intended

While no legislative authority specifically gave any directive to TVA to move in as a public utility, its administrative procedure of acquiring electric properties was generally permitted under the original Act and then specifically provided for in the amendments of 1935 and 1939.

It can hardly be assumed that Congress intended that customers of the aforenamed investor-financed utilities were to be deprived of electric service when the federal government, acting through TVA, acquired their properties. It must be assumed that Congress intended or sanctioned TVA's assumption of utility responsibility in the late '30s.

The annual report of TVA for fiscal year 1950 says of this issue:

> "Two developments since 1933 have altered TVA's responsibilities with respect to power. One development, approved by Congress, was the purchase of private utility facilities by TVA and municipal and cooperative distributors. As a result of these purchases, mainly consummated by 1939, TVA became the sole supplier of electric power for its present service area. It therefore became as are other utilities, whether publicly or privately owned, responsible for supplying all the need for power in its area." (The second development referred to was the war demand for power for aluminum production and for the atomic energy project at Oak Ridge.)

The drainage area of the Tennessee River is approximately 40,600 square miles. A little over 32,000 square miles is within the Tennessee Valley Authority electric service area. An additional 48,000 square miles outside of the Tennessee Basin are served by TVA.

Consumer Has No Choice

Under the administrative procedures of including a sole-supplier clause in its contracts and of controlling rates for resale of energy by distributors, TVA has solidified its utility position in the 80,000 square-mile service area.

The present service area includes practically all of the state of Tennessee, a major portion of the state of Mississippi, large areas in Alabama and Kentucky, and small territories in three other states—Georgia, North Carolina and Virginia.

Of major significance in relationship to the utility responsibility assumed by TVA is the fact that TVA's rates and operations are not subject to review or control by any regulatory agency. Neither state regulatory boards nor the Federal Power Commission have any jurisdiction over TVA. Thus, the electric users of the service area are denied safeguards available elsewhere in this country.

The Second Hoover Commission recommended:

". . . that the Congress empower and direct the Federal Power Commission to fix the rates on government power sales at such levels as will—(a.) eliminate the inequities now imposed upon the great majority of the people; (b.) amortize and pay interest on the federal investment in power plus an amount which will equal federal tax exemption based upon the federal taxes paid by the private utilities; and (c.) provide payments in lieu of full taxes to the state and local government equivalent to those the private utilities would pay."

A task force of the Commission recommended that the Congress enact legislation to provide that regulation of accounts, rates, and charges of federal projects be kept separate from other administrative activities, and that such regulation, including regulation of federal sales to federal agencies, be vested in the Federal Power Commission. Neither recommendation has yet been acted upon by Congress.

The Yardstick

Although many people were led to believe that the Tennessee Valley Authority would provide a "yardstick" for a sound measurement of electric energy prices, it has been generally recognized that the yardstick thesis is essentially a canard. Regardless of what conditions may have existed once upon a time, today the electric utility industry is a government regulated industry. While its various segments are freely allowed to suffer in the event of mismanagement, they are not allowed to prosper beyond a reasonable return, approximating 6 to 6½ percent, regardless of the caliber of management.

Unfortunately, the yardstick idea is still believed and used by people who are or should be aware of its inadequacies. For example, in 1957 a speaker from the TVA area addressing an audience in the northeastern part of the country pointed to electric rates in the TVA area and declared that the Northeast should demand comparable rates from the investor-financed utilities supplying them. For reasons best known to himself, he declined to state that TVA rates do not include any amount for federal taxes and that TVA does not pay the Treasury any interest on capital investment.

Actually, in light of the technical competence in this country, real cost differences in power production between public and private developments will be slight, *provided* all costs are included by each. This is particularly true in any given area. As between areas, however, differences in cost of fuel and particularly the distance fuel needs to be transported will be reflected in the cost of producing thermal power. Hydroelectric costs will, to some extent, reflect construction costs at the time the major structures were built. Examination of the records indicates, however, that the difference in cost between public power and private power is essentially a direct measure of the differences charged in interest rates and paid in taxes.

Power Costs Comparable

Comparative studies of several projects were made by the Bureau of the Budget and by the Atomic Energy Commission late in 1954. Assuming a uniform fuel cost of 19 cents per million BTU's and excluding all taxes, TVA high-load-factor energy at Oak Ridge, Tennessee, was computed to cost 3.78 mills per kilowatt hour, and at Paducah, Kentucky, 3.93 mills, as compared with the cost at the investor-owned Ohio Valley Electric Company at Portsmouth, Ohio, of 3.79 mills per kilowatt hour. A second computation, assuming a slightly different uniform fuel cost, produced estimates of 3.77 mills per kilowatt hour at Oak Ridge, 3.78 mills per kilowatt hour at Paducah, and 3.74 mills at Portsmouth.

Thus, eliminating differences in fuel costs and disregarding taxes, the cost of production at the three plants —two operated by TVA and the third by the investor-financed electric utility industry—were of the same general magnitude.

Examination of typical electric bills published by the Federal Power Commission shows that for residential service the difference in charges, between those in the TVA service area and those made by investor-financed utility in the immediate peripheral zone, is less than the interest and tax burden carried by investor-financed utilities. Specific figures, given in Table 19, discredit the yardstick theory. More importantly, they show that any monetary reduction in outlay through TVA's failure to pay interest and taxes is not passed on in full to the user of electric energy.

The General Accounting Office audit of TVA for 1956 lists 16 TVA distributors with rates of return on investment ranging from 12.8 to 22.3 percent. This situation probably would not exist if TVA wholesale rates and the retail rates charged by distributors of TVA were subject to governmental regulation the same as those of investor-financed utilities.

On March 21, 1956 in a talk before the American Power Conference, Brigadier General Herbert D. Vogel, TVA Chairman, had the following to say:

"I cannot ignore the very real advantage accruing to any system which operates for minimum earning rather than a normal profit and which is not required by law to pay interest on its obligations or income taxes to the federal government. . . . These result in consumer

TABLE 19

TYPICAL MONTHLY ELECTRIC BILLS, 1957

(Residential Service)

City	*Minimum*	*25 KWH*	*100 KWH*	*250 KWH*	*500 KWH*
TVA Service Area:					
Nashville	$0.75	$0.75	$2.50	$5.00	$6.90
Knoxville	.75	.75	2.50	5.00	6.90
Memphis	.75	.75	2.50	5.00	6.90
Chattanooga	.75	.75	2.50	5.00	6.90
Peripheral to TVA Service Area:					
Birmingham, Ala.	.70	.81	2.75	5.60	8.10
Atlanta, Ga.	1.00	1.20	3.61	6.13	8.65
Asheville, N. C.	1.00	1.00	3.40	6.75	9.00
Roanoke, Va.	1.50	1.50	4.14	7.59	10.14
Evansville, Ind.	1.00	1.25	3.85	7.35	10.48
Louisville, Ky.	.60	.88	2.60	5.60	8.10
Jackson, Miss.	.75	1.28	3.94	7.59	9.34
Greenville, S. C.	.80	1.39	3.36	6.36	9.51

SOURCE: Federal Power Commission.

advantages not enjoyed by customers of private power companies. Any talk about establishing a measure for the cost of power without reference to these factors is . . . absurd."

Tennessee and the Southeast

ALTHOUGH IT WAS APPARENT from the beginning that electric power was a primary objective of the Tennessee Valley Authority, other worthwhile objectives helped to justify its establishment. Proponents have always claimed that, incidental to the improvement of navigation and control of floods on the Tennessee River, the TVA would provide for conservation, national defense, and the social and economic rehabilitation of the Valley. All of these functions bore some direct or indirect relationship to TVA's primary purposes.

Proponents of TVA have been loud with praise and long on claims for the valley authority idea. They point to what has happened to the Tennessee Valley, to Tennessee, and to the region under TVA influence. The TVA was often hailed as a panacea. Its benefits were considered large and widespread. In the words of David E. Lilienthal, first Chairman of TVA (*TVA, Democracy on the March,* 1944):

"This is an entirely different region from what it was ten years ago. You can see the change almost everywhere you go. You can see it in the copper lines strung along back country roads, in the fresh paint on the houses those electric lines were built to serve. You can see it in new electric water pumps in the farmyards, in the community refrigerators at the crossroads, in the feed grinders in the woodsheds. You can see the factories that stand today where there were worn-out cotton fields and rows of tenant shacks a few years ago. You can see new houses by the thousands, on the edges of the towns—new houses of the men who take away as much cash from a few trips to the payroll window as they used to earn in a year."

Opponents of the federal authority method of development, on the other hand, saw the strong arm of central government funneling their tax dollars into projects which benefitted primarily the residents of the TVA area. "The Tennessee River," they said, "flows through seven states and drains 48." The magic of the authority to produce cheap power was disputed, and the effects of TVA on the local economy were seriously questioned.

Tennessee has received a major portion of the federal tax money collected in all 48 states and poured

into the TVA region. In theory, at least, the Tennessee economy should have grown at a faster rate than neighboring states which received smaller portions of the TVA investment. Has this happened, and has TVA produced social and economic rehabilitation in the area?

Economic Growth Compared

To help answer these questions, comparisons were made of economic growth in Tennessee and seven adjoining states: Virginia, North Carolina, Georgia, Alabama, Mississippi, Arkansas, and Kentucky. Three states in the southeastern region (Louisiana, South Carolina and Florida) were omitted from the study because they do not touch Tennessee.

The following eleven economic series were compared:

- Population
- Total personal income
- Income payments per capita
- Total wage and salary payments
- Farm marketings, cash receipts
- Value added by manufacture
- Production workers in manufacture
- Retail sales
- Deposits, all banks
- Postal receipts, gross
- Corporations filing federal income tax returns

Comparisons were made for each of the eleven series showing Tennessee growth and total growth in the other seven states. In general, three time periods were used: (1) 1933-40, TVA's early years in which river developments and related programs were emphasized; (2) 1940-50, period of war and post-war, with a switch from chemical munitions to atomic energy and the practical completion of the hydroelectric plant; (3) 1950-56, the recent years of steam-plant expansion and the change from "a noble experiment" to the largest electric utility in the world.

Comparison of Selected Series

INCOME PAYMENTS PER CAPITA. This series reflects changes in both population growth and total income payments. Between 1933 and 1940 Tennessee's income payments per capita rose 66.2% or slightly more than the seven southeastern states. Between 1940 and 1950 Tennessee rose 193.5% and the other states 201.6%. Between 1950 and 1956 Tennessee rose 32.4% and the other states 36.3%, making Tennessee's increase 89% of the seven states. Considering population growth alone, Tennessee surpassed the other seven states in the period since 1940.

TOTAL WAGE AND SALARY PAYMENTS. In this series Tennessee grew at rates quite comparable to the other seven states throughout the entire period.

FARM MARKETINGS, CASH RECEIPTS. The entire Southeast suffered decreasing cash receipts from farm marketing between 1933 and 1940, but in the next decade the increase was more than 250%. Tennessee fared nearly as well as the other seven southeastern states in that period. Between 1950 and 1956 Tennessee's receipts increased only one-third as much as the other states.

VALUE ADDED BY MANUFACTURE. Tennessee's growth as indicated by this series about paralleled that of the Southeast from 1933 through 1947. Since 1947, however, the Tennessee increase has been about 150% that of the other seven states. Value added by manufacture in Tennessee increased 74.6% between 1947 and 1954.

RETAIL SALES. Tennessee's growth as indicated by this series was about comparable to that of the other seven southeastern states throughout the full period. Between 1948 and 1954 Tennessee's retail sales rose 32%.

DEPOSITS, ALL BANKS. Between 1933 and 1940 deposits in all Tennessee banks increased 160.6%, and in the seven states 122.8%, making the Tennessee increase 131% that of the other states. Between 1940 and 1950 the Tennessee increase was 229% that of the other seven states. Between 1950 and 1956 the increases were 81.7% in Tennessee and 174.1% in the other states, making Tennessee's growth 47% that of the seven southeastern states.

CORPORATIONS FILING FEDERAL INCOME TAX RETURNS. The number of corporations filing in Tennessee actually decreased between 1933 and 1940, while holding about even in the other states of the area. Between 1940 and 1950 the increase was nearly the same in Tennessee as in the other states, at about 42%. A 10.5% increase in Tennessee beats the 6.5% increase in other states for three years beginning 1950.

Conclusions

In the period 1933-40 Tennessee grew faster than the other seven southeastern states in six of the eleven series and slower in two series. Decreases occurred in either Tennessee or the seven states in three series.

In the period 1940-50 Tennessee grew faster than the seven states in six series and slower in five series.

In the period 1950-56 Tennessee grew faster in four series and slower in seven series.

This comparison indicates a slightly faster growth over the entire period for Tennessee than for the surrounding seven states, but the rate of increase has slowed down considerably, particularly since 1950. Tennessee forged ahead of its neighbors during the beginning of TVA, but since TVA came on the scene the whole South has made rapid economic progress. Tennessee has shown less sustained growth than its surrounding states in spite of TVA spending.

It is not possible to prove from the data analyzed the extent to which TVA is directly responsible for the rate of economic growth experienced by Tennessee since 1933. Likewise, it will never be known whether the other seven states would have fared better or worse without TVA. This conclusion is supported by a finding of the Subcommittee on Fiscal Policy of the Joint Economic Committee of Congress, reported on January 23, 1958. After studying the impact of federal spending programs on the economy, the Subcommittee stated that it "found no necessary relationship between the amount of Federal expenditures and the rate of economic growth over the long run."

SUMMARY APPRAISAL OF TVA

In the quarter century that TVA has been in operation, it has received in appropriated funds, transferred property and bond issues $2,041,000,000 and has received as operating revenues from its power program $1,474,000,000. It has repaid to the Treasury a total of $278,000,000.

Dams and Power Plants

For this expenditure, a series of multiple purpose locks and dams for navigation, flood control and electric power production has been constructed on the Tennessee River and its tributaries. The structures are generally recognized as being well-designed, well-built, and well-operated. The electric power capacity of the hydraulic structures has been supplemented by steam plants with over twice as much capacity as the hydro plants. These steam plants appear to be comparable in all respects to modern steam plants constructed by the investor-financed utilities.

Fertilizer Production

A research and production fertilizer manufacturing facility has been developed at which meritorious contributions to fertilizer development have been made. However, at times the developmental programs have been allowed to become unfairly competitive with investor-financed taxpaying production.

Resource Development

TVA has undertaken many resource development activities which in other areas are undertaken by other departments of the federal government or by state and local interests.

Flood Control

Notwithstanding the excellence of flood-control structures, almost as much land has been inundated permanently by the reservoirs as would have been flooded occasionally by extreme floods. As yet, the two principal damage centers on the Tennessee River, Chattanooga and Rossville, are not adequately protected.

Navigation

While a nine-foot navigation channel has been built over the 652 miles of main river from Knoxville to the mouth, commerce has not developed at rates commensurate with estimates used in justifying navigation improvement and with predictions made 30 years ago.

Utility System

Starting with the development of electricity as an incident to river control works, TVA has built up the greatest single utility system in the world. It services some 80,000 square miles in a region extending almost completely across one time zone. Its hydraulic structures were built largely at a time when construction costs were low. Its steam plants have been built in recent years and compare favorably with the most recent modern structures. The system has very few old high-cost product plants to impair the economy of its activities.

Low Fuel Cost

The area has adjacent coal fields that permit obtaining fuel at relatively low costs compared to many other areas of the country. In establishing this electric utility system, the government has driven out of business the investor-financed systems that had previously been established in the area.

Engineering

Many of the engineers and administrators assigned to the work have carried out their responsibilities under law in an admirable fashion. The record supports the conclusion, however, that many of the individuals who have been in charge of operations have believed that government entry into business activities in competition with its citizens is a pattern of development preferable to the private enterprise system under which the real strength of this nation has been developed. Administrative practices have been shaped to this end.

Power Subsidy

The electric utility operations of TVA have been carried out under law permitting the assessment of a large portion of the cost against the general taxpayer rather than against the power user. As the system has grown in size, the burden on the general taxpayer has increased.

Production of electric energy by TVA for fiscal year 1957 amounted to 57,038,606,000 kilowatt hours. The average production cost, according to TVA figures, was 2.403 mills per kilowatt hour. This energy was sold at an average rate of 4.12 mills per kilowatt hour and brought in a gross revenue of $234,871,850. The net reported income was $58,143,669.

Cost Exceeds Revenue

Computation shows that the power operations have cost at least $267,880,435 more than the net revenues during the period of TVA operation from its inception to June 30, 1957. For fiscal year 1957 the true cost of energy was at least 5.06 mills per kilowatt hour and the value of the energy was nearer 6.21 mills than the 4.12 mills actually charged.

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